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ABSTRACT

State legislation and new funding mechanisms have changed the traditional landscape of school financing. This publication contains papers by presenters at the annual National Center for Education Statistics (NCES) State Data Conference. Following the foreword, acknowledgments, introduction, and overview, the papers include: (1) "Testimony to the Subcommittee on Education, Arts, and Humanities of the Committee on Labor and Human Resources, U.S. Senate" (G. Alan Hickrod); (2) "Adequacy Issues in Recent Education Finance Litigation" (R. Craig Wood); (3) "A Report on Educational Facilities" (David S. Honeyman); (4) "Defining and Measuring Opportunity to Learn" (Andrew C. Porter); (5) "The $300 Billion Question: How Do Public Elementary and Secondary Schools Spend Their Money?" (Lawrence O. Picus and Minaz Fazal); (6) "Education Finance Indicators: What Can We Learn from Comparing States with Nations?" (Thomas M. Smith); and (7) "International Comparison of Teacher Salaries and Conditions of Employment" (E. Howard Nelson). References accompany each chapter. Eighteen tables and five figures are included. (LMI)

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DEVELOPMENTS IN SCHOOL FINANCE

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DEVELOPMENTS IN SCHOOL FINANCE

William J. Fowler, Jr., Editor

Fiscal Proceedings from the Annual NCES State Data Conference July 28-30, 1993

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January 1995

Contact:
William Fowler
(202) 219–1921

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Foreword

Paul D. Planchon, Associate Commissioner
Elementary and Secondary Education Division

Of all the areas within public elementary and secondary education that are experiencing rapid change, none is experiencing more turmoil than school finance. In part, this is the result of the action of state courts and state legislatures. Innovative proposals and new funding mechanisms are changing the traditional landscape of school district financing. This activity in states has created a renewed interest in school funding at the federal level.

Developments in School Finance contains papers by presenters at the annual National Center for Education Statistics (NCES) State Data Conference. The Conference attracts several state education department policymakers, analysts, and data providers from each state, who are offered training sessions and updates on developments in the field. The presenters are experts in their respective fields, each of whom has a unique perspective or interesting quantitative research to bring to bear on emerging issues in school finance. The reaction of the participants to these presentations was overwhelmingly positive. We hope that will be your reaction as well.

This report is the first publication of the proceedings of the State Data Conference. The papers are intended to promote the exchange of ideas among researchers and policymakers. Because the views are those of the authors, the papers may provoke discussions, replications, replies, and refutations. If so, the publication will have accomplished its task. There would be nothing so satisfying to the Center as promoting and contributing to the field of school finance.

Acknowledgments

William J. Fowler, Jr., Editor

The editor wishes to gratefully acknowledge the comments and suggestions of the reviewers: Lee Hoffman, Marilyn McMillen, and Susan Ahmed of the National Center for Education Statistics (NCES). I also wish to acknowledge the contributions of Julia Pelagatti, Leslie Hilleary, Ellen Morgan and Philip Myers of **R**ii, who incorporated the text and graphics into a published document.

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Introduction and Overview

William J. Fowler, Jr.
National Center for Education Statistics

About the Author

Dr. William J. Fowler, Jr. is an education statistician at the U.S. Department of Education National Center for Education Statistics (NCES), who specializes in school finance and educational productivity research. His work has centered on redesigning the federal school finance data collection to obtain information that can provide more policy-oriented analyses for the school finance community. NCES has reinstituted a state and school district finance data collection for the first time in more than a decade, and is currently funding exploratory research work.

Prior to his work at NCES, Dr. Fowler served as a supervisor of school finance research for the New Jersey Department of Education, taught at Bucknell University, and at the University of Illinois. He also served as a senior research associate for the Central Educational Midwestern Regional Educational Laboratory (CEMREL) in Chicago, and for the New York Department of Education.

Dr. Fowler has been a member of the American Education Finance Association since 1977, and was elected to its Board of Directors in 1992. He is a co-editor of *Organizational Influences on Educational Productivity*, to be published by the JAI Press, and serves on the editorial board of the *Journal of Education Finance*. He obtained his doctorate in education from Columbia University in 1977.

Introduction and Overview

William J. Fowler, Jr.
National Center for Education Statistics

Public school financing in the United States costs nearly $300 billion annually. With a subject as important as education, it is not surprising to see public involvement in U.S. management of this mammoth investment, particularly in education funding distribution issues. But even for those who follow each state supreme court ruling on the constitutionality of a state school funding formula, it is difficult to keep track of the decisions, appeals, and new filings on a nationwide basis. After one has compiled the raw data on these decisions, the results are still difficult to depict as a single mosaic. It is this task that the first presenter, **J. Alan Hickrod,** takes on as he describes his research at a recent congressional testimony.

Disparities in expenditures between affluent and less affluent school districts have persisted for years, often at 2:1 ratios (that is, the wealthier school districts spend twice what poor school districts spend). These disparities are becoming more pronounced over time, as a result of rapid changes in property valuations. Despite some states increasing their average support levels for school districts to half of total state revenue, the local property tax continues to be the main support of elementary and secondary educational services. Although suburbs have adequate financing from the local property tax, central cities and rural areas do not.

At least 12 state supreme courts have decided that state funding systems that depend heavily on local property taxes are unconstitutional. But litigation to achieve more equitable funding can be an interminable process, extending over more than a decade. Although all states, except one, contain some education article in their state constitution, some states choose to address funding inequities through school district reorganization and consolidation, because separate elementary and secondary districts, rather than large unified districts, are an organizational form that yields greater funding disparities. However, rural communities often oppose such reorganization because of the central role of the school in such communities.

Professor Hickrod summarizes research on the responses of states with differing court outcomes and proposes six "specific actions that the federal government might take to enhance equal educational opportunities and reduce disparities in service levels between school districts." According to Professor Hickrod, the federal government could: first, bolster the provisions of the Elementary and Secondary Education Act that

distribute federal funds based on the number of children in poverty within a school district; second, invoke a federal supplement, or perhaps embark on revenue sharing for states that reduce the disparity in spending or services among school districts; third, penalize school districts with enrollments of fewer than 100 pupils to encourage consolidation; fourth, strengthen the hand of those attempting to collect accurate school district data; fifth, form a Presidential Commission on School Finance; and finally, consider adding an education amendment to the U.S. Constitution.

The nature of fiscal equity suits may be changed by a recent Alabama Supreme Court decision in *Harper v. Hunt,* in which the court ruled that the entire public school system in Alabama was "inadequate by virtually any measure, including the state's own standards of adequacy." Regardless of the state or the distribution formula used by a state, fiscal equity suits bear a remarkable similarity in their arguments. In some cases, plaintiff districts find they must increase their local fiscal efforts to obtain moneys under the state distribution formula. More troubling is the fact that a formula can create an equality of poverty, so a state distribution formula can be equitable, yet inadequate. The second presenter, **R. Craig Wood,** seeks to illustrate the differences between equity and adequacy standards.

Professor Wood discusses how adequacy standards differ from equity standards by focusing on the purchased programs or the offered educational benefits. The issue in adequacy arguments is whether students have the same access to the same quality programs. The adequacy issue forces an examination of what fiscal resources purchase in terms of programmatic opportunities; in *Harper v. Hunt,* the Alabama court examined state standards for facilities, curriculum, staffing, textbooks, supplies and equipment, and transportation. In addition to equal programs, the adequacy standard requires appropriate programs for specific populations.

While equity asks the degree to which expenditures correlate with local wealth, adequacy asks the degree to which expenditures correlate with programmatic opportunity. Inadequacy may be shown by wealthy districts having more extensive curricula, more up-to-date computer equipment, lower student-teacher ratios, better educated and experienced staff, or better student support services, such as libraries and student counselors. Most recently, some states have defined adequate education through state legislation. In Alabama, inadequate schools were judged so because they failed to meet state accreditation standards, state education standards, or specific state performance requirements.

Two papers address measuring adequacy: one from a traditional standpoint of a report on educational facilities, and one from a newly emerging concept called *opportunity to learn.* The first paper, by **David S. Honeyman,** discusses the present condition of public school facilities, including their age, deferred maintenance, the condition and adequacy of these buildings, and the relationship of school facilities to instruction. Although the number of states contributing aid to school districts for facilities dramatically increased after World War II, that aid represents only about 20 percent of all funds for capital outlay and debt service, because the majority of facilities funds originate from the local property tax. This reliance on property tax allows wealthy communities to maintain superb school facilities, while poorer communities must defer maintenance and building. Consequently, more than half of the Nation's schools are estimated to have been built before 1960, and some estimates of deferred maintenance exceeded $90 billion in 1993. Estimates of the percentages of inadequate school facilities range from 16 percent to 25 percent of the Nation's schools (the inadequacy was partially generated by government mandates, including asbestos abatement, access for the handicapped, and more stringent safety and fire code compliance). This would suggest that more than 5 million students are housed in substandard school buildings. State courts have become increasingly concerned about the ability of school districts to provide adequate facilities.

Another concern about school facilities is their appropriateness for educational programs. Although empirical studies cannot demonstrate that the physical environment has an effect on the behavior, achievement, and performance of students and teachers who occupy a building, many assert that school effectiveness deteriorates

in the absence of appropriate facilities. In addition to problems with deterioration over time, many older buildings are inadequate, regardless of their upkeep, to support new learning technologies. Many older schools have structural impediments to wiring with fiber-optic cable necessary for computers and they house libraries that are not suitable as multimedia centers. Some older school buildings are energy-inefficient and lack climate control for year-round use.

The other paper on measuring adequacy, by **Andrew C. Porter**, attempts to define and measure the still-evolving opportunity-to-learn and school delivery standards concepts. School delivery standards attempt to protect a student who may not have access to a good education by defining the kind of education that offers the opportunity to learn the knowledge and skills that will be assessed by the school, the state, institutions of higher learning, or employers. Porter distinguishes among several types of education standards, which are often used interchangeably. Opportunity-to-learn standards have a history, and include the enacted curriculum (focused upon the content of instruction), the pedagogic quality of instruction, and the resources available to students and teachers. Service delivery standards embody opportunity to learn, quality of school life, and school organizational features.

Professor Porter asserts that there are three ways for school delivery standards to protect students from a poor education: first, by envisioning schooling that provides a quality education to shield students from inadequate instruction; second, by implementing an indicator system that would grade existing schooling; and third, by creating school-by-school accountability. Porter regards school-by-school accountability as the least attractive strategy because of the long history of poor results from using inputs and processes for holding schools accountable. Students who graduate from noncertified schools would still suffer the consequences of a poor education. An indicator system, however, could serve as an evaluation instrument for monitoring school reform by demonstrating the degree of successful change in the mathematics program. Such indicators may also assist educators in understanding why students do not reach the desired outcomes. The true purpose of service delivery standards, according to Porter, is to provide a vision of good practice, representing detailed accounts of effective instructional practices and school strategies.

In Porter's view, school delivery and opportunity-to-learn standards cannot be met without adequate funding for individual schools. "Without adequate funding," he states, "a vision of good instruction is beyond reach, monitoring school practices for descriptive purposes is a waste of time, and holding schools and students accountable for what they produce is unfair." Funding is a continuous variable rather than a dichotomy of adequacy, and schools must function with the funding that they receive.

Perhaps most perplexing to the uninitiated in school finance is how public elementary and secondary schools spend the funding that they receive. **Lawrence O. Picus** and **Minaz B. Fazal** attempt to answer this question, using data from the National Center for Education Statistics—from both the Common Core of Data and the Schools and Staffing Survey. These data sets permitted three research questions to be addressed: "How do current expenditures per pupil for elementary and secondary education vary across school districts and states after adjusting for interstate differences in cost?"; "How do pupil/teacher ratios vary among states, school districts, schools, and individual classrooms when accounting for district characteristics?"; and "How do teacher-reported class sizes differ from aggregate calculations of district and school pupil-teacher ratios?"

Picus and Fazal find that most school districts spend approximately 60 percent of their resources on direct instruction and that "very little variation exists in the share of total resources that are devoted to instruction." Thus, as districts receive more money, they continue to spend in the same proportion. City per-pupil spending increases as city size increases, suburban districts tend to spend more than the large or very large cities they surround, and rural areas exceed the average spending of small cities. Yet the proportion of expenditures devoted to instruction is similar, regardless of geographic locale.

As a district spends more, average class size declines. The average pupil/teacher ratio in public elementary and secondary schools has declined between 1955 and 1991, from 26.9 to

17.2 pupils per teacher. However, Picus and Fazal find that pupil/teacher ratio and class size are not synonymous. Reported average elementary class size from the Schools and Staffing Survey is 24, compared with 18 pupils per teacher from school district data. The explanation for the difference is special education classes—included in the national averages—which often have mandated size limits. Also, some itinerant teachers provide special pull-out services for children for such programs as Chapter 1, gifted and talented education, and art and music instruction, and some teachers have nonteaching assignments, such as counseling or curriculum development. As district size or school size increases, fewer teachers have assignments outside the regular classroom. Districts that spend more not only have smaller class sizes but also employ more teachers with assignments outside of the regular classroom.

Concern over education finance issues is not exclusive to the United States. In 1987, the Organization for Economic Cooperation and Development (OECD), a 24-member group of the world's more developed countries, launched the International Indicators of Educational Systems project. International experts developed indicators to illustrate the condition of education in the OECD countries. In 1992, OECD published a set of indicators in *Education at a Glance,* with a successor volume in 1993. As an extension of this work, **Thomas M. Smith** compares states and nations using education finance indicators. Three important indicators of public financial support for education are public expenditure on education per student, a dividend of that expenditure by gross product per capita, and the same expenditure expressed as a percentage of gross domestic product (GDP) or gross state product (GSP). Based on these measures, the United States spent more per student at the elementary and secondary level than did any of the other "group of seven" (G-7) countries having the largest open economies in the world. These comprise Canada, France, Germany, Great Britain, Italy, and Japan. Only Canada had a higher level of current public expenditure as a percentage of GDP than did the United States.

Smith concludes that the United States invested more public money in its students than did most of its G-7 counterparts. However, the share of U.S. public resources devoted to education was about equal to that of the other G-7 countries. Individual states seem to have invested strongly in students in comparison with the OECD countries. The range of public expenditures on education as a percentage of gross product by both states and countries was similar, ranging from 3 to 4 percent of GSP or GDP. As a result of these findings, Smith concludes that the United States does not appear stingy in its public investment in education when compared with other large, industrialized countries.

Another internationally comparative study, this one of teacher salaries and working conditions in 19 countries, is presented by **F. Howard Nelson.** Using data not regularly published by UNESCO, OECD, or international teachers' unions, the 1992 salary comparisons are based on national, state, regional, or provincial salary schedules at three career points: beginning, mid-career (15 years), and maximum. Where possible, bonuses, stipends, supplements, and overtime are included, but fringe benefits and employer-paid contributions to pension funds and national social security are excluded. However, salary comparisons must take into account working conditions, such as longer weeks and longer years. At the primary level, U.S. teachers have smaller classes than do teachers in Japan, Spain, and Ireland and about the same size classes as those in England and the Netherlands. U.S. primary teachers spend more time in the classroom and less time preparing for teaching than do other teachers. At the secondary level, U.S. class size seems to be average, although U.S. teachers teach more classes than do their foreign counterparts. Surprisingly, U.S. primary teachers spend more time with students (over 30 hours per week) than do teachers in any of the 19 countries examined. U.S. secondary teachers teach more hours per week than do teachers in any other country. The salaries of U.S. primary teachers are higher than in most other countries (in U.S. dollars), but they are just below average relative to national standards of living. American secondary school teachers are less well trained and paid less than their counterparts in other countries. Almost every Nation studied based teacher salary on a schedule relying primarily on years of experience. However, most also have a national salary schedule, while the United States has great variety among its more than 15,000 school districts.

Testimony to the Subcommittee on Education, Arts, and Humanities of the Committee on Labor and Human Resources, U.S. Senate (Revised and Extended, July 1993)

G. Alan Hickrod
Center for the Study of Educational Finance
Illinois State University

About the Author

G. Alan Hickrod is a distinguished professor of education administration and foundations at Illinois State University and director of its Center for the Study of Educational Finance. A Harvard graduate with a doctorate in education, he is a leading authority on school finance, social and economic foundations, and statistics and research methods. Dr. Hickrod has directed approximately 18 different educational research grants and authored numerous publications for academic review. His work includes over 75 monographs and books and 65 articles and papers on school finance and education research. Publications have regularly appeared in the *Journal of Education Finance, Journal of Educational Administration, Educational Administration Quarterly, American Education Research Journal, Review of Educational Research, Education and Urban Society*, etc. He is also a regular contributor to the "Constitutional Challenges" and "Selected Readings" sections for the Illinois State Board of Education publication, *State, Local, and Federal Financing for Illinois Public Schools*.

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Testimony to the Subcommittee on Education, Arts, and Humanities of the Committee on Labor and Human Resources, U.S. Senate (Revised and Extended, July 1993)

G. Alan Hickrod
Center for the Study of Educational Finance
Illinois State University

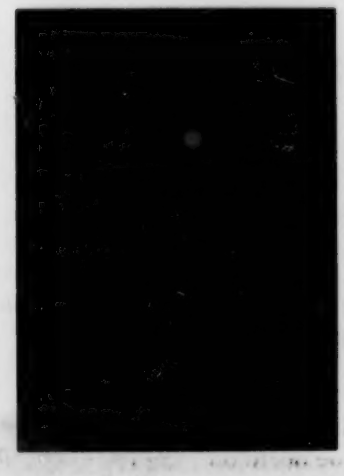
My name is G. Alan Karnes Wallis Hickrod, and I have the honor of being the Distinguished Professor of Educational Administration and Foundations at Illinois State University (ISU). I am also Director of the Center for the Study of Educational Finance at ISU and a past president of the American Education Finance Association. I deeply appreciate the opportunity to be heard on an issue that I have studied for some time.

The Subcommittee meets this afternoon to review a public policy problem that has been widely known for quite some time. The first study of disparities in goods and services provided among school districts, that I know of, was conducted in Massachusetts not long after the Civil War. In the early 1920s, many studies of differences between expenditure levels of schools appeared, the earliest in Illinois in 1922. It is no surprise that there are very large differences in expenditure levels among school districts within a state, often extending to a 2:1 ratio; that is, the more affluent districts spend twice as much as the less affluent districts. These ratios of nearly 2:1 are present even after some rather deviant high- and low-spending districts are eliminated from the population of districts in a state. While educational professionals have known about these differences for a long time, I think that the public in general was not aware of them until the recent best-selling book, *Savage Inequalities* by Jonathan Kozol, made them cognizant of these differences.

A new factor, an ominous factor in this situation, is the fact that in many states these disparities in spending levels are growing rapidly with the passage of time. Our studies in Illinois indicate that for the last 15 years there has been a constant and relentless growth in inequalities in spending levels among school districts. Very wide disparities have also been noted in Massachusetts, Pennsylvania, New York, Ohio, Missouri, and Texas. A common development can be ascertained in these seven states, where there is often a ring or rings of commercial, industrial, and residential development around the major central cities. This laudable economic development results in property valuation booms. For example, outside Chicago—in Barrington, Illinois—property valuations have doubled in a short 5-year span of time. This is sometimes caused by the location of high-tech industries in these suburban belts and residential property speculation, but the result is the same. The property valuations rise rapidly. Elsewhere in these states, particularly in rural areas, there are school districts whose property valuations are either not

increasing as fast or are in absolute decline. In the Midwest, the plight of small towns is especially bad as they continue to lose businesses, banking facilities, medical facilities, and other essential services. This unequal regional and largely intrastate economic development causes many problems, not the least of which are in school finance.

In the United States, we continue to rely upon the local property tax to support K-12 educational services. Consequently, as these property valuations become more unequal, the level of support for education will also become more unequal. A solution to the problem immediately suggests itself, which is so obvious that it would not require a Senate hearing. Why not move the support of education away from the local property tax and over to a statewide tax, either the state sales tax or the state income tax, or some combination of state revenues, if the state has such taxes? Some states have done exactly this. In fact, there is a very large range in state support for K-12 education. For example, New Hampshire provides only roughly 7 percent of its K-12 educational funds from state sources, while Alabama provides nearly 70 percent from state sources. Many states seem to be moving toward a situation in which 60 percent of the K-12 funds will come from state sources and 40 percent from local sources, excluding federal funds. However, many other states seem unable to move at all in this regard. The explanation of this "gridlock"—or, as some observers have called it, "greedlock"—lies in a combination of demography and state politics.



Within the last couple of decades, more and more of the American population has moved to the suburbs of central cities. Over time—sometimes very slowly—political power has followed the population. The result, in modern state legislatures, has been that state senators and representatives from suburban areas have assumed more control over events in these legislative bodies. This seems especially obvious in the state senates. So, for the last couple of decades, I have had to look squarely in the eyes of state senators and state representatives from the more affluent suburbs and tell them that the educational equity problems in their state require them to take tax funds from their constituencies and send those funds across the state to other constituencies which are not so prosperous. It is a very disconcerting experience. They look at you as if you have flown over the cuckoo's nest, or maybe dropped in from the planet Mongo with Flash Gordon. (This last reference will surely date me, if my appearance does not.) They cannot stand for re-election to their state legislatures on any such platform. The fact that a few are willing to do so is probably more eloquent testimony to the worth of public education in a democracy than any I could give here today. The fact is—the suburbs, while they have some educational problems, are largely content with their adequately financed educational systems. The problems lie in the central cities and more rural areas of the state. The suburban members of the legislature do not want to assist in what they regard as "someone else's problems."

Is there any way out of "gridlock," or "greedlock," if you prefer? Yes, occasionally a strong governor will propose a reform program and carry it through his legislative body. Unfortunately, one may have to wait a long time for that to happen. In my judgment, the last governor in Illinois who could honestly be called an "education Governor" was Richard Ogilvie, a Republican, and that was many years ago. The state legislatures also respond to pressure from their state supreme courts. In 12 states in the Union, systems of funding that strongly depend on the local property taxes have been found unconstitutional, and the states have responded by moving away from the local property tax to support education. My Center at ISU tracks these constitutional cases, with some support from the American Education Finance Association; a full listing of the statuses of these cases is attached as an appendix to this monograph.

Litigation is a slow and laborious process. It is not at all unusual for these constitutional cases to last for 10 to 15 years, and occasionally even longer. However, long-term gains can be made in these cases. In 10 states, the right to an adequate education has been declared a fundamental right under the state constitution. Much depends upon the interpretation of the education article in the state constitution. Unlike the federal Constitution, every state except one has an education article in its constitution. Much of the recent activity in the state courts centers on spelling out just exactly what those education articles require the state government to do relative to educational funding. It may be possible to strengthen the existing education article in a state's constitution by replacing the old article with an article that contains stronger language to establish education as a fundamental right. This was attempted in Illinois and failed by only 3 percent of the vote. Illinois requires 60 percent to amend its constitution, and the attempt to amend received 57 percent—which, by the way, was a larger vote than that received by either President Clinton or Senator Carol Moseley Braun in that state, though not enough to amend the constitution and make education a fundamental right.

It is also true that states can make some progress on this problem by school district reorganization and consolidation. Inequalities between school districts are often much worse in states that have so-called "dual districts," that is, separate administrative structures for high schools and elementary schools, as well as K-12 units. However, reorganization and consolidation is vigorously opposed in many rural communities because the school may be the last vestige of organizational life left in that community. If rural decline has taken away the bank, the businesses, and the local doctor, then the church and the school may be all that is left to give cohesiveness to the little hamlet or village. It should be noted that southern states have an advantage on this inequality problem in two respects. First, the unit of educational governance in the southern states is the county, not the special district, as in the North. Second, on the whole, the southern states finance their K-12 education more from the state level than from the local level. For these two reasons disparities are less in the South than in the North and Midwest.

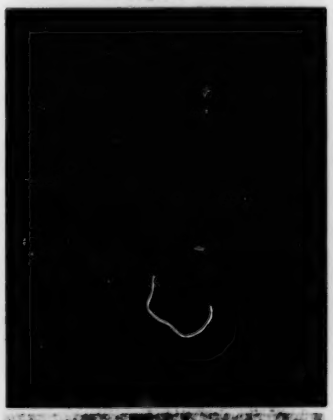
I will conclude this testimony by outlining a program of six specific actions that the federal government might take to enhance equal educational opportunities and reduce disparities in service levels between school districts. I must first deal briefly, however, with the question, "Does money make a difference?" Money certainly makes a difference in terms of what is offered to students in schools. Studies in Illinois clearly show that the curricula of the better financed schools are wider and deeper than those of the poorly financed schools. If one takes the case of a hypothetical school at $6,000 per child per year versus one at $3,000 per child per year, the $3,000 school will lack both advanced placement courses and remedial courses. Choice will also be greatly limited in the $3,000 school. The lower funded school may have no foreign languages at all and may also have no advanced math courses. Offerings in music and art will likely be sparse. Without going into excessive detail, it can be said that the lower priced education is a "bare bones" affair, providing only the minimum state requirements.

While there is little question that expenditures relate to educational services provided, there is controversy over whether expenditures relate to outputs such as test scores. Professor Hanushek and his colleagues strongly suggest that they do not.[1] Perhaps a clue lies here in the curriculum matter. Even the worst-funded school in Illinois

[1]From testimony given by Dr. Eric Hanushek, Professor of Economics at the University of Rochester, in *Committee for Educational Equality v. Missouri*, Circuit Court of Cole County, Missouri, January 15, 1993.

will offer the minimum state requirements in verbal and quantitative education; it must, in order to be certified by the state Department of Education. It is specifically these cognitive areas that are tested on most "output" tests. The lower funded schools can, therefore, do reasonably well on those tests because what they fail to provide is simply not tested.

There are also serious technical problems with the "production function" studies that provide the basis for the conclusion that "money does not make a difference." Before teaching school finance, I taught statistics, and I can assure you that the multiple linear regression technique contains assumptions that, if violated, will lead to false policy conclusions. One assumption, often violated in production function studies, is that expenditures per pupil and socioeconomic level of the district are independent variables. This is clearly false. The socioeconomic district level (often measured by the per capita personal income of the district) and the expenditure level of the district are highly correlated. It is, therefore, extremely difficult, if not impossible, to ascertain the separate and independent effect of expenditure per pupil on test scores, holding constant the socioeconomic district level. At the Center at ISU we are experimenting with a quantitative technique called the "quadriform," which may offer a way around this problem; but this approach is experimental at this stage of development. The fact that most production functions are linear rather than curvilinear is also a matter of concern.



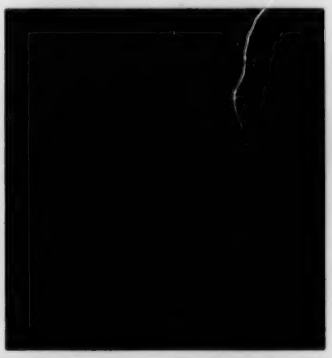
Now, to the program I am recommending: first, as you move toward reauthorization of the Elementary and Secondary Education Act, I urge you to strengthen the provisions that distribute federal funds on the basis of child poverty concentrations in school districts. The states of Illinois and Minnesota have had many years of experience with this particular variable. It generally assures that the funds go to the school districts with the most problems. Extensive research at Illinois State University and elsewhere shows that, where a majority of the students come from poverty homes, test scores from those districts decline precipitously. The range on this variable is vast. In Illinois, we go from school districts that have fewer than 1 percent of school children from poverty homes to districts that have nearly 100 percent of the school children from poverty homes. In East St. Louis, about which Jonathan Kozol[2] writes so vividly, nearly 90 percent of the children are from poverty homes. In one of the largest school districts in the United States—Chicago—a majority of pupils come from poverty homes. Clearly, some progress can be made here by making much of the distribution of federal funds dependent upon this variable. Since it is true that even some affluent suburban districts have at least some children from poverty homes, the Act should also provide that the needs of poor students in rich districts be met. But it must be emphasized that in the districts where 70 percent or 80 percent or 90 percent of the children are from poverty-level homes, the situation is truly desperate.

Second, I believe the time has come to look again at legislation introduced into this body over 20 years ago, in the 92nd Congress, by Senators Stevenson, Mondale, and Javits, with a companion bill which I think was introduced by Representative Carl Perkins in the House. A bill also may have been introduced about that time by Representative Obey of Wisconsin. These bills offered a federal supplement for states that would reduce the disparity in goods and services between school districts. A problem will emerge here, however, regarding whether the reward is offered "ex post facto" or "ex ante." If it is offered after the fact, California will receive the federal reward, since it has made progress in reducing disparity. However, it may be a very long time for Illinois to receive any reward because we have been going in the other direction, more inequalities, for nearly 15 years. On the other hand, if enough reward is provided, perhaps one might be able to turn around even Illinois. I do not think a penalty by the federal

[2]Jonathan Kozol is a freelance writer based in Byfield, Massachusetts who has written several books on education.

government would work. If one penalizes Illinois for going in the wrong direction by withdrawing federal funds, a severe penalty would be placed upon East St. Louis. Surely, that is the last thing anyone would want to do.

An alternative to the second recommendation might be to reinstitute "revenue sharing" between the federal government and the state government. It is an incontrovertible fact that the *only* time the state of Illinois made any serious progress on closing the disparities in funding between school districts was in the early 1970s, when revenue sharing funds were made available from the federal level. Should the revenue-sharing program be reimplemented, perhaps this time the funds could be specifically earmarked to reduce the disparities in service levels among school districts.



Third, there is one place in which a federal penalty might work. I hesitate to suggest it, but I think I must: there are many school districts in this Nation with fewer than 100 pupils. Many years ago, after an extensive study of high schools, James Bryce Conant, then president of my alma mater, Harvard, said that high schools of fewer than 100 students could not provide for the educational needs of students, particularly in the sciences. Present-day research seems to agree with President Conant's opinion. To be sure, there are probably "necessarily existent" small schools in mountainous areas or in the vast reaches of west Texas. These could be exempted. But I see little reason to send federal funds into districts that are far too small to be economically efficient. Consolidation and reorganization can also be greatly encouraged by a federal program that would help build new regional high schools. In Indiana, a useful compromise was reached by having the small towns retain the elementary schools and establishing a new high school for several small towns. This reward approach is probably better than a penalty approach.

In this vein, it seems to me that there is not enough articulation among committees of Congress, such as this one and the data-gathering and analyzing elements of the executive branch. I understand the desire to keep the National Center for Education Statistics (NCES) and the Office of Educational Research and Improvement (OERI) somewhat clear of partisan politics, but data collection and analysis unrelated to the issues that this and other committees of Congress are considering can become esoteric at best, and futile and sterile at worst. Better to have the research partisan than to have the research irrelevant to the major policy issues of the day.

Fourth, the Congress could and should strengthen the hand of those who are attempting to collect accurate data on this public policy problem. It is not easy to collect data on more than 13,000 school districts in this country. Few modern nations have this kind of data collection problem. Later this week, I will address this problem at a meeting of NCES in Washington. I would commend highly to this body the efforts of William Fowler of NCES, Larry MacDonald of the Bureau of the Census, and Wayne Riddle of the Congressional Reference Service. They have done remarkably well with very few resources. Moreover, we cannot make good policy with bad data, and something more will have to be done here. I have tried to enlist the assistance of OERI on this matter but, so far, have not met with much success. Perhaps this is due to the change in administration.

Fifth, perhaps the time has arrived to create another Presidential Commission on School Finance. We had such a Commission during the Nixon administration and, while the major recommendations of that Commission were not accepted, many valuable ideas emerged from the Commission. For example, the notion of distributing funds on the basis of poverty concentration had its genesis in that Commission. That idea was not adopted at the time by the federal government, but by the state governments in Illinois and Minnesota. There are younger, perhaps more able, students of school finance in this land. We should give them a forum to bring forth new ideas in this area.

Finally, if only to demonstrate that I really am from an "ivory tower," I would argue that the time may have arrived to consider adding an education amendment to the national Constitution. Remember, I am not totally in that tower and have just come from a battle to try to do this at the state level. I know many of us in this room would probably not live to see such an amendment ratified by the necessary number of states. However, I think that ultimately this whole matter turns on the right of a child to an adequate education. Count me among those who believe that this right should be enshrined in the U.S. Constitution. In a recent publication entitled *Invictus,* I have argued—for probably the millionth time in my long career—that without a guarantee of an adequate education for every child, this republic will not long stand. In that publication, I outline some good political, economic, and social reasons for believing that "no strong public school, then no strong representative system of government." If the disparity problem is not addressed by either the state or national governments, we will slowly drift toward a society in which the affluent school districts have good schools and the poor school districts have terrible schools. That drift will eventually take us to a beach in which government by a well- educated elite is possible and the poorly educated will have little participation in the governing process. I was a Marine; I have landed on many beaches before and I do not want to hit that beach.

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APPENDIX
Status of School Finance Constitutional Litigation

Compiled by G. Alan Hickrod and Gregory Anthony
August 1993

I. Plaintiffs won at state supreme court level (9):

Arkansas	*Dupree v. Alma School District*, 1983
Kentucky	*Rose v. The Council*, 1989
Texas	*Edgewood v. Kirby*, 1989
Tennessee	*Tennessee Small School Systems v. McWherter*, 1993
Massachusetts	*McDuffie v. Weld*, 1993
Washington	*Seattle v. Washington*, 1978
Connecticut	*Horton v. Meskill*, 1977
*Missouri	*The Committee v. Missouri* *Lee's Summit PSU v. Missouri*, 1994
Arizona	*Roosevelt Elementary School Dist. 66 v. Bishop*, 1994

II. Plaintiffs won at state supreme court level but filed further complaint (5):

Wyoming	*Washakie v. Hershler*, 1980
California	*Serrano v. Priest*, 1971, 1977
West Virginia	*Pauley v. Kelly*, 1979, 1988
New Jersey	*Robinson v. Cahill*, 1973
Montana	*Montana Rural Education Association v. Montana*, 1993

III. Plaintiffs lost at state supreme court level and either lost or did not file further complaint (10):

Michigan	*Milliken v. Green*, 1973
Georgia	*McDaniels v. Thomas*, 1981
Colorado	*Lujan v. State Board of Education*, 1982
Maryland	*Hornbeck v. Somerset County*, 1983
Wisconsin	*Kukor v. Grover*, 1989
Oregon	*Olsen v. Oregon*, 1979 *Coalition for Ed. Equity v. Oregon*, 1991
Minnesota	*Skeen v. Minnesota*, 1993

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*Partial win only: Dismissed State's appeal on technical grounds.

North Dakota[1]	*Bismark Public Schools v. North Dakota, 1993*
Nebraska[8]	*Gould v. Orr,* 1993
Viginia[8]	*Alleghany Highlands v. Virginia,* 1991 (Case withdrawn 8/91)
	Scott v. Virginia, 1994

IV. Plaintiffs lost at the state supreme court level but filed a further complaint (7):

Pennsylvania[3]	*Dansen v. Casey,* 1979, 1987
	Pennsylvania Association of Rural and Small Schools v. Casey, 1991
Ohio[3,5]	*Board of Education v. Walter,* 1979
	Howard v. Walter, 1991
	Thompson v. State of Ohio, 1991
	DeRolph v. State, 1992
New York[4]	*Board of Education v. Nyquist,* 1982, 1987
	Reform Educational Financing Inequities Today (R.E.F.I.T.) v. Cuomo, 1991
Idaho[3]	*Thompson v. Engelking,* 1975
	Frazier et al. v. Idaho, 1990
Louisiana[3]	*School Board v. Louisiana,* 1987, 1988
	Charlet v. Legislature of State of Louisiana, 1992
South Carolina	*Richland v. Campbell,* 1988
	Lee County v. Carolina, 1993
North Carolina	*Britt v. State Board, 1987*
	Leandro v. State, 1994

V. Litigation is ongoing and/or a lower court ruling has been issued, but no supreme court decision has been rendered (8):

Illinois[4]	*The Committee v. Edgar,* 1990
Alabama[5]	*Alabama Coalition for Equity v. Hunt,* 1990
	Harper v. Hunt, 1991
Alaska[6]	*Matanuska-Susitna Borough v. Alaska,* 1989
South Dakota	*Bezdichek v. South Dakota,* 1991
New Hampshire[6]	*Claremont, New Hampshire v. Gregg,* 1991
Rhode Island[5]	*City of Pawtucket v. Sundlun,* 1992
Kansas	(consolidated)
	Newton Unified School District 373, et al. v. Kansas, 1993
	Unified School District 229, et al. v. Kansas, 1991
	Unified School District 244, Coffey County, et al. v. State
	Unified School District 217, Rolla, et al. v. State
Maine	*M.S.A.D. 1 v. Leo Martin,* 1992

VI. No litigation or the case is dormant (11):

Delaware	
Hawaii	
Iowa	
Florida	*Christiensen v. Graham*
Oklahoma	*Fair School v. State*, 1987
Indiana	*Lake Central v. Indiana*, 1987
Mississippi	
Nevada	
New Mexico	
Utah	
Vermont	

Category A: States in which the state supreme court has declared that education **is a fundamental** constitutional right (14):

Arizona	*Shofstall v. Hollins*, 1973
Wisconsin	*Busse v. Smith*, 1976
California	*Serrano v. Priest*, 1977
Connecticut	*Horton v. Meskill*, 1977
Wyoming	*Washakie v. Hershler*, 1980
West Virginia	*Pauley v. Bailey*, 1984
Montana	*Helena v. State*, 1989
Kentucky	*Rose v. The Council*, 1989
Tennesseet	*Tennessee Small School Systems v. McWherter*, 1993
Washington	*Seattle v. Washington*, 1978
Massachusetts	*McDuffie v. Weld*, 1993
Minnesota	*Skeen v. Minnesota*, 1993
New Hampshire	*Claremont, New Hampshire v. Gregg*, 1991
Virginia	*Scott v. Virginia*, 1994

Category B: States in which the state supreme court has declared that education **is not a fundamental constitutional right** (10):

New Jersey	*Robinson v. Cahill*, 1973
Michigan	*Milliken v. Green*, 1973
Idaho	*Thompson v. Engelking*, 1975
Oregon	*Olsen v. State*, 1976
Pennsylvania	*Dansen v. Casey*, 1979
Ohio	*Board v. Walter*, 1979
New York	*Levittown v. Nyquist*, 1982
Colorado	*Lujan v. Colorado*, 1982
Georgia	*McDaniel v. Thomas*, 1982
Arkansas[7]	*Dupree v. Alma*, 1983

Category C: Lower court decision on education as a fundamental right:

1. States in which a circuit or appellate court has declared that education is a fundamental rights (5):

Alabama	*Alabama Coalition for Equity v. Hunt*, 1993
Missouri	*Committee v. Missouri*, 1993
Minnesota	*Skeen v. Minnesota*, 1992
North Dakota	*Bismarck Public Schools v. North Dakota*, 1993
Ohio	*DeRolph v. State*, 1994

2. States in which a circuit or appellate court has declared that education is not a fundamental right (2):

Illinois	*Committee v. Edgar*, 1992
New Hampshire	*Claremont, New Hampshire v. Gregg*, 1991

[1]Majority (3) ruled in favor of plaintiff but North Dakota requires four justices to declare a statutory law unconstitutional
[2]Hearing completed at Supreme Court level
[3]Defeated Motion to Dismiss
[4]Litigation of Motion to Dismiss
[5]Circuit Court decision in favor of the plaintiffs, no appeal in Alabama
[6]Circuit Court decision in favor of the defendants, reversed in New Hampshire
[7]States in which the funding system failed to pass the "rational basis" test of the equal protection clause
[8]Lost on Motion to Dismiss or Motion for Summary Judgement

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Adequacy Issues in Recent Education Finance Litigation

R. Craig Wood
University of Florida, Gainesville

About the Author

R. Craig Wood is a professor and co-director of the UCEA Center for Education Finance at the University of Florida. He has published over 100 works, including the textbooks *Fiscal Leadership for Schools* and *Principles of School Business Management.* He teaches education finance and law courses at the University of Florida and has conducted finance litigation workshops for the National Association of Attorneys General. In addition, he is Senior Partner of Wood, Thompson & Associates and has served as an expert witness in educaton finance litigation cases in more than a dozen states.

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Adequacy Issues in Recent Education Finance Litigation

R. Craig Wood
University of Florida, Gainesville

Introduction

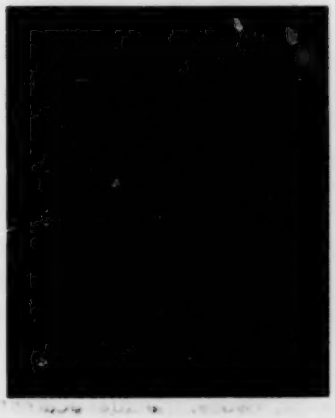
Within the public arena, one of the inherent burdens in our system of decisionmaking is the reality of constant short-term decisionmaking on a variety of social, political, and economic issues. In fact, the political arena tends to be totally fixated on short-term objectives. This fixation is fully applicable to the arena of financing public elementary and secondary education. One example is the issue of Head Start-type programs for disadvantaged youth. Head Start programs are generally quite cost-effective when measured in terms of economic returns to society. Yet these programs constantly struggle for their existence. The inherent weakness of Head Start-type programs is that they generally do not produce measurable results within policymakers' frame of reference. On a larger scale, the short-term political and economic fixations are found at both national and state levels, throughout the financing of public education.

Within this environment, one can suggest that the public is clearly concerned with the adequacy of public education. National opinion polls indicate that the public is concerned with issues of providing a quality education for the next generation. It is also evident that those who possess enough fiscal resources to enroll their children in private schools at an average cost of nearly $7,500 per year perceive an inadequacy in public education. This perception of public schools' inadequacy may transcend issues of actual academic quality because of the presence of drugs and violence in the public schools at large. These issues represent a dichotomy of public opinion: the public wishes to increase the adequacy of public education while exhibiting a reluctance to increase revenues to public education. The public policy debate becomes complete when it is argued that public education should emulate private education, with its significantly higher expenditures, in order to become more adequate.

It must be noted that public education in certain states is unequal and inadequate in its application. In certain states, public education may only benefit those who have previously achieved a degree of fiscal success within society. In fact, it can be argued that public education in certain states perpetuates a society of vast social and economic cleavages reflecting both inequity and inadequacy in the education finance distribution system. Difficult policy and fiscal issues arise concerning the degree to which fiscal

resources are necessary to assure an adequate education for every child in a state.

While complaints of inadequate public education may sometimes be justified, it is often the situation that the plaintiffs claiming inadequacy make little effort for internal fiscal change. In certain instances, if the fiscal distribution formula were to be significantly changed, the plaintiff districts would have to substantially increase local revenues to meet the basic level of expenditures used in the distribution formula. In this case, there is little doubt that the overall formula may actually disadvantage plaintiff districts. Yet when the formula is adjusted, local policymakers often find themselves in the awkward position of having to increase local taxation in order to participate in the new state aid level. Thus, while the overall state fiscal effort would need to increase, local fiscal efforts may have to increase as well to have the overall state distribution formula equitably operationalized. This fundamental fact is often overlooked by plaintiff school districts as well as their public education finance experts.



Adequacy issues may be found in early education finance litigation. *Brown v. Board of Education*, the first case to have a significant impact on modern court equity decisions, gave stimulus to equity concerns by emphasizing the importance of education throughout our society. The United States Supreme Court stated:[1]

> Education is perhaps the most important function of state and local governments. In these days, it is doubtful that any child may reasonably be expected to succeed in life if he is denied the opportunity of an education. Such an opportunity, where the state has undertaken to provide it, is a right which must be made available to all on equal terms.

It is argued that if one child were to receive inadequate fiscal resources by virtue of his or her birth, while another child does, in fact, receive adequate resources leading to a better education, we must examine these causal issues on a higher order conceptualization of equity. Therefore, in order to maximize liberty, liberty must extend to all in some realistic fashion. In order to maximize the common good, however, deviations from absolute arithmetic equity may occur. Thus, a sense of basic fairness can be applied to those with special needs (i.e., deficits).

Notwithstanding the realities of a given distribution formula, plaintiffs and certain authorities have never acknowledged that any formula presently utilized in the United States is acceptable. The research literature presents no issue of remedy, adjustment, or solution. The same criticisms are presented regardless of the type of formula utilized or which state uses it. Thus, the arguments are virtually the same, regardless of the ability of state and local communities to afford equity and adequacy in the distribution pattern. Education finance researchers often have a difficult time acknowledging that distribution formulas are rational; they were created, albeit in a problematic political environment, to distribute limited state revenues in some rational manner.

Local school district policymakers do not spend a great deal of time and energy discussing their concerns and needs with state legislatures; they simply litigate the issues. Public school districts have discovered the world of realpolitik that dictates that litigation seems to be the most cost- and time-effective strategy; but this litigation blitzkrieg is often accompanied by what has been called the law of unintended consequences. Local policymakers seem to fully embrace the belief that whatever the facts concerning the distribution formula, they are irrelevant; inadequacy is the fault of the state—it cannot possibly be the fault of local public policymakers.

[1] 74 S.Ct. 686.

The Concept of Adequacy

The facts are rather straightforward: based on percentages of the gross national product, our society spends less for public elementary and secondary education than do most western countries. It has long been noted that our children spend less time in school than do those of all our economic competitors. More interesting is the presence of other social and economic issues, which are interwoven in this societal dilemma. These include the following facts:

- Children below the age of 6 years are burdened by poor health care, scarce child care, and almost nonexistent preschool opportunities for the poorest of our society;
- Children of the very poor experience unsafe neighborhoods with nonexistent positive cultural reinforcements;
- Over 500,000 children under 6 years of age are not covered by any form of health insurance;
- One-fourth of pregnant women have no prenatal health care, which places their unborn children at risk; and
- At least 35 percent of children who enter kindergarten are unprepared to learn, lacking the skills in vocabulary and sentence structure that are crucial to success in school.

Despite the realities of these overwhelming social issues and the weaknesses of our society, public education distribution formulas are what get described as inadequate. A closer examination of our society yields the observation that all of society can be described as inadequate on a variety of social and economic issues. Further, to assume that existing inadequacies can be resolved solely by a distribution formula is simplistic and does not present a constructive path for the future. Economic reality dictates that greater adequacy is certainly a worthwhile goal but is achievable only over a lengthy period of time because of severe constraints of state fiscal capacities.

Previously, it has been this researcher's observation that education finance operated in a fairly efficient manner. That is not to suggest that efficiency equated with fundamental fairness; it is to say that it was relatively inexpensive and perhaps even cost-effective. This system reflected the efficiency of the marketplace, although public education did not operate based on supply and demand of the open marketplace. Society substituted the state legislature as the marketplace for competing political and economic concepts as society substituted the political arena as a proxy for the arena of the marketplace.

Unfortunately, this distinction fails to grasp the realities of the distribution of scarce resources. An examination of distribution patterns often reveals vast disparities of resources and educational opportunities that result. This observation can be referred to as "politics by printout." The reality often reflects that the typical state legislature is "Balkanized" by competing self-interests.

Thus, it is argued that the current arena of competing interests has long since moved from the economic marketplace to the political arena of the state legislatures, and then moved into the judicial arena. The judicial arena, with all its strengths and weaknesses, will become even more the marketplace to settle competing ideas and philosophies, as well as conflicting political and economic interests and tensions. Thus, the courts will arbitrate the distribution of scarce resources and define adequacy for society. Specifically, the courts will become the conveyors and policymakers of public education because the various state legislatures have abdicated and will continue to abdicate their responsibilities for setting education finance policies, particularly in the arena of distribution of state resources to all the residents of a given state. Often, the state

legislature has proven powerless in this endeavor, and thus the shift of power from the legislature to the courts is a natural and logical result of this total void of political leadership on the state level.

In our present political environment, governors' offices largely exhibit a vacuum of leadership because of the political constraints and residuals that flow from the individuals who occupy such positions. Our society is paying a heavy price, as these offices are generally reflective of the nature of transient officials. In order to have an adequate public education system for all schoolchildren of a state, taxes will significantly increase with no guarantee of a political return, or at least one in a supportive sense. Thus, the logic becomes that if state taxes must be raised, it is more politically acceptable to have the courts order this endeavor to avoid political residuals. Given this arena, the governors' offices have largely abdicated their traditional roles. Within this vacuum, the judiciary has emerged as the avenue of reform, the vehicle of change, and the final arbitrator of fiscal educational policy in America.

Further, once the avenue of redress becomes solely lodged in the judicial sphere, one would argue that education finance litigation will explode with increased activity, as it is presently doing. Additionally, education finance litigation is serial in nature. The plaintiffs will return again and again in order to have the court order fully implemented as to how they perceive that the decision should be operationalized (Wood 1992).

If equity were not the vehicle for gaining greater moneys, then adequacy could become the shining path. The pursuit of equality in the education finance arena is natural and fundamental to seeking protections to offset the fundamental disadvantages of our society. In many states, it is evident that equality of education opportunity has been powerfully conditioned by wealth and social status, which flow directly from education. Thus, the concept of equality continues to elude many children who have had to depend on a seriously flawed distribution formula for the hope of education opportunity. Despite the fact that a formula may reflect perfect equity, it is possible that the formula has created an equality of poverty. That is to say, the distribution formula can be equitable, yet inadequate (Thompson et al. 1993).

In order to illustrate the differences between equity and adequacy, certain aspects of the dilemma must become apparent. Under an equity standard, the state is asked if it has achieved full equity. If it has, then the questions center on how the state has achieved it; if it has not, they address the reasons why (Wood and Thompson 1991). Under an equity standard, plaintiffs may demonstrate that education is not equal throughout a given state. This same issue can be addressed in terms of an adequacy standard (i.e., are programs adequate for the needs of all the pupils across a given state and within the poorest school districts.) Thus, the questions are very similar, yet they are conceptually different as to the research approach necessary to operationalize the issues. Such issues can be examined in a quantitative or qualitative manner, or some combination thereof. Matched-pair studies have recently been utilized by plaintiffs in an attempt to operationalize the quantitative arguments.

The three most commonly utilized models of statistical evaluation can be designed to examine equity as well as adequacy (Wood and Thompson 1993). In terms of resource accessibility, the equity standard asks whether students have equal access to fiscal resources. Under adequacy arguments, the issue is whether students have the same access to the same programs. In terms of wealth neutrality, the equity argument examines whether fiscal resources are related to local wealth. Under an adequacy standard, the examination is one of what fiscal resources purchase in terms of programmatic opportunities.

In terms of equity, the tax yield standard examines whether equal tax effort results in equal tax yield. The state, on the other hand, in terms of an adequacy examination, will examine

whether selected school districts (i.e., the plaintiffs) make an adequate contribution compared with all other nonplaintiff school districts. Thus, a state may be able to utilize adequacy as a powerful defense mechanism, depending upon the circumstances and issues before the court.

Additionally, adequacy standards examine the issues of not only equal programs but also specific programs for specific populations. If the plaintiffs were able to show a lack of programmatic opportunity correlated with a lack of resource accessibility, then the plaintiffs have a powerful argument. Often, available large data sets are not examined by the plaintiffs, who typically tend to rely on individual testimonials. States have to carefully demonstrate that such personal testimonials do not necessarily establish a trend on which to make judgments for the entire system of financing public education.

In essence, the distinction between an equity argument and an adequacy argument can be stated as follows:

- To what degree do local and state expenditures correlate with the lack of local wealth?
- To what degree do local and state expenditures correlate with a lack of programmatic opportunity?

The first question is an equity issue, while the second is an adequacy issue. In an adequacy complaint, the plaintiffs must demonstrate a substantive impact on students. Examinations tend to center on comparisons of the plaintiffs with the nonplaintiffs in terms of wealth, income, enrollments, demographic variables, and specifics concerning the educational programs.

Often, the plaintiffs attempt to demonstrate their inability to update texts, hire teachers with advanced degrees, purchase school buses on a periodic basis, offer equal special education programs as compared with other school districts, withstand budget reductions, support special education aid cuts, and so on. Properly presented, these issues are adequacy issues more than they are equity issues.

It would be a grave error in judgment to assume that all current suits are somehow attempting to better the quality of education for the next generation. Several current suits are without legal or statistical merit and may be misguided attempts on the part of local policymakers to attack a given formula when they have no empirical quantitative or qualitative evidence. In these scenarios, a group of superintendents allege that a given formula disenfranchises them by virtue of one or more weaknesses in the distribution scheme. They then make the assumption that the formula is ripe for constitutional challenge.

In order for states to defend the distribution formula, they must have a realistic and persuasive defense based on quantitative and qualitative data. For states to continue to argue that moneys make no difference in the educational process is flawed enough to make other arguments highly suspect. Such arguments concerning the nonapplicability of moneys to public education are easily disproven, contrary to education finance research, and nonsensical to courts.

In *Edgewood v. Kirby*, the Texas Supreme Court examined the state methodology for distributing state moneys. The Texas Supreme Court stated:[2]

> The amount of money spent on a student's education has a real and meaningful impact on the educational opportunity offered that student. High-wealth districts are able to provide for their students broader educational experiences, including more extensive curricula, more up-to-date technological equipment, better libraries and library personnel, teacher aides, counseling services, lower student-teacher ratios, better facilities, parental involvement programs, and drop-out prevention programs. They are also better able to

[2]777 S.W.2d at 393.

attract and retain experienced teachers and administrators.

Several state supreme courts have ruled that moneys do make a difference in terms of equal educational opportunity (*Abbott v. Burke, Rose v. Better Educ., Edgewood v. Kirby, Helena v. Montana, Dupree v. Alma*). The plaintiffs attempt, via data, to demonstrate that moneys correlate highly with the quality of public education, as measured by such issues as programmatic opportunities, as these opportunities are the measurements of adequacy.

In *Abbott* in New Jersey, throughout the over 1,000 pages of testimony, commissioner's reports, and the supreme court opinion, the plaintiffs constantly stressed the disparities of selected rich districts versus selected poor districts in terms of adequacy issues that included such specific issues as programmatic offerings in computer education, foreign languages, science, fine and performance arts, physical education, and advanced placement courses. Further adequacy issues included student-teacher ratios, extracurricular activities, counseling services, audiovisual supplies, library facilities, and staff.

Of recent origin in such court cases is the attack on the use of increased performance standards when moneys do not appear to significantly increase mandated outcomes. Several states have defined adequate, equal, and excellent education through legislation. For example, one state recently passed the following series of statutory mandates:[3]

> "...All districts will be required to standardize a curriculum aligning with the state goals of an adequate and excellent education for all schoolchildren, which encompasses social sciences, literature, languages, the arts, mathematics and science...students shall be tested, and shall be designed to prepare all students for employment and/or postsecondary education.
>
> That in every school year, the State Board of Education shall cause a norm-referenced test to be administered to every student enrolled in grades three, five, seven, nine, and eleven in the areas of reading, mathematics, language arts, communications, science, and the principles of citizenship...test data is [to] be utilized to prescribe skill reinforcement and/or remediation by requiring districts to develop and establish a specific program of improvement based on the test results.
>
> That all standards promulgated by the state board shall meet or exceed the standards of the [regional] Association of Schools and Colleges...that any school failing to meet accreditation standards shall be closed or annexed."

These standards are becoming more representative of state legislative actions regarding performance of local schools. As the mandates become more pervasive, numerous dilemmas are created. When the standards are specifically operationalized with no additional moneys for public schools to implement such requirements, relatively poorer school districts have vastly greater inabilities to meet such requirements. Hence, states have created adequacy lawsuits by their own legislative actions.

Thus, when state legislatures operationalize selected education reforms, two inescapable events will follow. First, by such stringent mandates, legislatures warrant to all school districts the ability to provide excellence in public education. Second, the legislature has installed itself as the educational and fiscal partner in school district operations so that the state must deliver the necessary fiscal resources in order to enable compliance. Such legislative actions create massive difficulties in that states may no longer claim that such variations and inadequacies are a permissible function of a definition of local control. Under the prescribed conditions,

[3]Thompson et al. 1992.

operationalization of reform requires uniformity of educational opportunity (Thompson et al. 1992).

School district revenue capacity is mitigated by state aid. Given the common knowledge that school districts have differing expenditure levels on a per-pupil basis, how widely do they vary? Stated in the context of adequacy, how much difference is there among school children in terms of programmatic opportunities as demonstrated by the amount of moneys actually spent on direct instructional activities, given that state legislatures have mandated excellence in education for every child? Adequacy questions focus on actual expenditure differences among children after the effect of state aid, or whether the formula provides adequate revenues in an appropriate distribution scheme.

State Applicability or Adequacy

In the most recent decision from Alabama (*Alabama Coalition for Equity v. Hunt* and *Harper v. Hunt*), the circuit court upheld the plaintiffs' contention on a wide variety of issues, including those regarding the lack of adequacy. Specifically, the court ruled that the entire public school system in Alabama was "inadequate by virtually any measure, including the state's own standards of adequacy." Further quoting the court:[4]

> "The court understands the term "educational opportunities" to mean, in the broadest sense, the educational facilities, programs and services provided for students in Alabama's public schools...and the opportunity to benefit from those facilities, programs, and services. "Equal" educational opportunities need not necessarily be strictly equal or precisely uniform...whether these opportunities are discussed in terms of school funding, of the programs purchased with such funds, or of the actual educational benefits offered...equality of benefit does not import identity of benefit, which is obviously impracticable. Adequacy connotes sufficiency for a purpose or requirement."

The court further viewed that public schools were inadequate in both absolute and relative terms. In an absolute sense, the schools were inadequate based on accreditation standards, state education standards, and specific performance requirements existing in Alabama.

Testimony revealed that in some selected schools, certain basic courses could not be offered. Specifically, in at least some school districts, no calculus courses were offered, and some schools did not offer art, music, or foreign languages of any description. In some public schools there was no physical education and health care was quite limited. The court opined:[5]

> "...The court finds the evidence is compelling that many Alabama schools fall below standards of minimal educational adequacy for facilities, curriculum, staffing, textbooks, supplies and equipment, and transportation...."

The court also viewed the system as a whole in that if inadequate educational opportunities existed in certain school districts, then the entire distribution system had to be judged as inadequate.

Education Fiscal Adequacy in Massachusetts

At the time of this writing, the most recent education finance litigation concerning adequacy was before the Massachusetts Supreme Judicial Court in *McDuffey v. Secretary of Education*. The court upheld the plaintiffs' claims including those addressing the inadequacy of the education finance distribution formula. Plaintiffs claimed

[4] *Alabama Coalition for Equity v. Hunt* and *Harper v. Hunt*.
[5] Ibid.

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that the system of financing public education denied them an adequate education within their school districts. Specifically, plaintiffs claimed the educational opportunities available to them in the cities and towns in which they lived were inadequate. The financial resources in their schools were so low as to render their schools unable to provide students "the opportunity to receive an adequate education."[6] In finding for the plaintiffs, the court noted the irrelevance as to which combination of parties was to blame for the inadequacy in the school districts.

Summary

Adequacy issues in education finance litigation appear to be growing in importance. Adequacy complaints may be able to offer the opportunity to operationalize the issues of inequity. Inequity is more than statistical differences relative to revenues and expenditures. Adequacy may offer the path for plaintiffs to demonstrate the differences that moneys make in operating public schools.

When relatively poorer school districts demonstrate the differences in direct instructional programs that operationalize the lack of equal educational opportunity, this concept becomes a powerful model for plaintiffs in certain states. It is important to note that efficiency, adequacy, and equity arguments can be won or refuted via analysis and strategy of a quantitative as well as a qualitative design by both plaintiffs and states. Many states have lost court challenges because of a relatively inflexible attitude that moneys do not make a difference. Such "Maginot Line" defenses have proven largely unproductive and fruitless.

However, neither equal expenditures nor unequal expenditures mean equality. Courts may accept vast unequal expenditures if they are equitably and adequately distributed on some reasonable basis (e.g., cost-of-living indices, sparsity adjustments, categorical programs, and special programs for high-risk students). All of these moneys must relate to wealth, or lack thereof, as well as to the needs of school children. Hence, an inherent adequacy component is found throughout such discussions.

As the court in Massachusetts viewed, the blame in such issues is largely irrelevant. Both state legislatures and local school districts, as well as the populace, benefit from having equitable and adequate financing of public elementary and secondary schools.

Adequacy issues, as discussed herein, may offer the path for reform in certain instances. However, in other instances, it may serve merely as a subterfuge for inherently weak equity arguments. Thus, the issues will remain within this arena for the foreseeable future, along with the necessary critical analyses to judge such arguments.

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[6] *McDuffey v. Secretary of Education.*

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A Report on Educational Facilities

David S. Honeyman
University of Florida, Gainesville

About the Author

Dr. David S. Honeyman is an associate professor of Educational Leadership at the University of Florida and serves as the director of The Center for Educational Finance for Florida.

In addition, Dr. Honeyman is co-director of the University Council of Education Administration (UCEA) Center for Education Finance at the University of Florida, technical advisor, and expert witness for the Governor and Commissioner of Education of the State of Florida panel studying school finance, and is the current president of the American Education Finance Association.

Dr. Honeyman recently co-authored a new text book in educational finance and has written over 70 articles, monographs, and book chapters on education finance and school facilities in both the K-12 public school and post secondary higher education areas, including several reports for NCES. He has conducted many studies investigating the financing of public education in several states and has reported on financing community colleges in the United States. In addition, he has conducted several studies on school facilities issues and has completed an analysis of public school facility problems in the United States.

A Report on Educational Facilities

David S. Honeyman
University of Florida, Gainesville

Introduction

The study of educational facilities has a broad and expansive history. The National Educational Finance Project Study (1971) reported that 100 years ago, when legislatures began enacting laws to allow the issuance of bonds for public school districts, they were primarily concerned with three things: protection of the bond purchasers, limitations on the amounts spent on construction, and limitation of the public debt. Issues concerning the condition of school facilities and the financing methods used to support the construction of school buildings (capital outlay) were of little concern in the early years of our country. Schools were constructed by community members, and there were no thoughts of tax rates, bonds, or bond referendums (Wood 1986). As late as 1941, it was reported that only 12 states made some financial provision for capital outlay and debt service in support of school facility needs.

The study of public elementary and secondary educational facilities in our society has recently become more important in the national agenda. Traditionally, public elementary and secondary educational facilities were thought to be a local concern. At the turn of the century, the rapidly growing population increased the need for construction and renovation of public educational facilities throughout the Nation. Communities constructed schools with little, if any, consideration of tax rates, bonds, or bond referendums (Thompson et al. 1994).

After World War II the number of states that contributed to capital outlay and debt service increased dramatically. Possible reasons for this increase include the fact that few school buildings were constructed during the Depression, the population was expanding rapidly, many states were realizing a surplus of state revenues, and more and more states were establishing minimum standards for facilities. However, since the 1960s, most school finance reform has involved state fiscal equalization plans. Despite the pressing need for educational facilities, many school districts with relatively low-assessed valuations have considerable difficulty financing educational facilities.

State aid for capital outlay and debt service grew from $78 million in 1951 to $633 million in 1970, to approximately $1.4 billion in 1979. Yet even after this tremendous expansion of state aid, nearly 80 percent of all funds for public school

capital outlay and debt service originated as local property tax (Wood 1986), and by 1992, bonded indebtedness of school districts was estimated at $12 billion (American Association of School Administrators 1993). On the national level, despite litigation addressing fiscal equity during the 1970s and 1980s, issues surrounding school construction, capital outlay, and debt service have been relatively limited (Thompson et al. 1994).

An increasing number of states have shown an interest in addressing the issue of funding school facilities. State participation in funding school facilities has evolved, causing a slow but evident trend toward state involvement in such projects. In 1989, 35 states provided some type of fiscal assistance in the form of equalizing grants, loans, and authorities or some combination thereof to school districts for capital outlay projects. State fiscal aid plans vary from no assistance in several states to the assumption of full cost by the state in Hawaii and California (Thompson et al. 1994).

Despite the increased fiscal participation by certain states in funding capital outlay projects and debt service, most school districts throughout the United States are facing school facility needs with no provisions for capital outlay and debt-service funding. Generally speaking, state plans for capital outlay and debt service are inadequate and inequitable in meeting overwhelming educational facility needs.

Overview of the Present Condition of Public School Facilities

Several issues have emerged concerning the poor condition of school facilities. These can be summarized as follows:

1. The age of school buildings;
2. Accumulated levels of deferred maintenance;
3. The condition and adequacy of buildings; and
4. Programmatic and instructional changes

The Age of School Buildings

Many school facilities across the Nation are old and have exceeded their instructional usefulness. Every study conducted in the past 10 years has reported an ever-increasing number of school buildings that are old and in need of help. Reports have indicated a constant increase in the number of questionable facilities operated by public schools throughout the United States from approximately 25 percent in the early 1980s (American Association of School Administrators et al. 1983) to 30 percent in 1986 and 1988 (Honeyman et al. 1989; Education Writers Association 1989), to almost 45 percent by 1993 (American Association of School Administrators 1993). Further, each of these reports states that nearly 30 percent of all public school facilities were built before 1950, and one noted that

Table 1.
Age of school facilities in the United States

Source of data	Year built				
	Before 1950	1950-59	1960-69	1970-79	1980-92
American Association of School Administrators (1993)	30%	21%	22%	14%	11%
Education Writers Association (1989)	(28%)	(26%)	(25%)	(16%)	(6%)

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buildings ranged in age from 43 years to "over 100 years" (Honeyman et al. 1989). These studies have consistently demonstrated the continued aging of school buildings currently in operation in U.S. school districts.

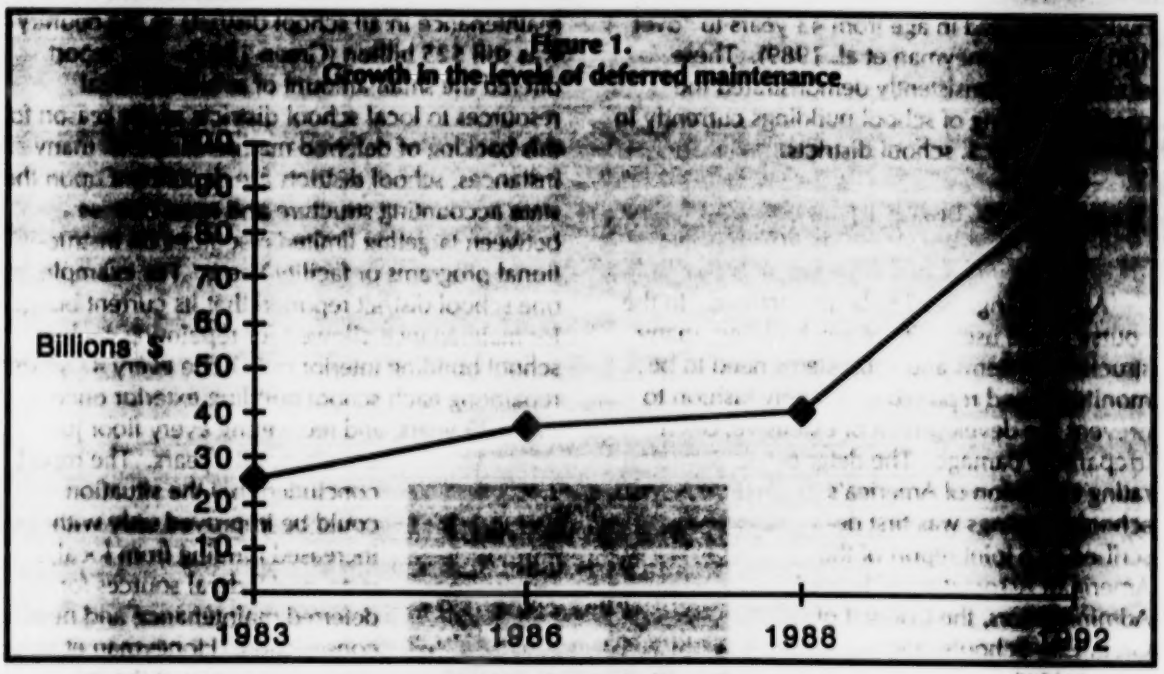
Accumulated Levels of Deferred Maintenance

All buildings need to be maintained. In the course of the useful life of any building, many structural systems and subsystems need to be monitored and repaired in a timely fashion to prevent the development of extensive, often irreparable damage. The deteriorating condition of America's school buildings was first described in a joint report of the American Association of School Administrators, the Council of Great City Schools, and the National School Boards Association (1983). One hundred school systems were surveyed and the results documented billions of dollars of accumulated deferred maintenance, capital improvement needs, and a lack of compliance with federal and state health and safety requirements. The study reported $25 billion as a conservative estimate of the total accumulated costs for repair of the Nation's public elementary and secondary schools. The expansion of levels of deferred maintenance in many school districts has resulted in inadequate coverage of many existing facility needs. The great demand for new school construction in growing areas, combined with tightly restricted budgets in other areas, forced many school districts to overlook maintenance and modernization of old schools; consequently these schools face staggering renovation or replacement problems. In addition, school building designers prior to the 1950s could not have anticipated changes in educational programs that made many schools constructed during that period obsolete.

By 1987, the situation had not changed. A Council of Great City Schools report documented that the cumulative costs of deferred building maintenance in all school districts in the country was still $25 billion (Green 1987). The report offered the small amount of available fiscal resources to local school districts as the reason for this backlog of deferred maintenance. In many instances, school districts are dependent upon the state accounting structure and must choose between targeting limited resources on instructional programs or facility needs. For example, one school district reported that its current budget for maintenance allowed for repainting each school building interior only once every 47 years, repainting each school building exterior once every 29 years, and recovering every floor just once every 39 years. The report concluded that the situation could be improved only with increased funding from local, state, and federal sources for deferred maintenance and new construction. Honeyman et al. (1989) reported that the estimated levels of deferred maintenance in the United States averaged $300,000 per building, and the Education Writers Association (1989) found that one of every four school buildings in America was in poor condition and more than half needed maintenance and major repairs.

Various estimates of deferred maintenance and repair in public educational facilities, both within certain states and across the Nation, show that the current status of school facility problems is not limited to urban, suburban, or rural districts. UNIPLAN (1982) estimated that repair and modernization of New Jersey's urban, suburban, and rural school facilities would cost $2.8 billion. In 1985, rural Kansas school districts had deferred more than $25 million of needed building maintenance and repair (Honeyman and Stewart 1985). There was additional evidence of school maintenance needs in Kansas urban school districts, (Devin 1985). The Council of Great City Schools report estimated the cumulative cost of deferred building maintenance in the 44 largest urban districts nationwide to be $5 billion.

Figure 1.
Growth in the levels of deferred maintenance



At the national level, subsequent studies indicate that the levels of deferred maintenance for all schools in the Nation have grown from $41 billion in 1988 (Education Writers Association 1989) to more than $90 billion in 1993 (American Association of School Administrators 1993). State education agencies and their respective legislative bodies should seriously consider the expansion of deferred maintenance levels and the rate at which these levels have grown in the last 10-year period (see figure 1).

Condition and Adequacy

In addition to the fiscal concerns of school facilities, several important questions need to be addressed when considering the condition of an educational facility. Is the school facility conducive to the instructional program at a particular site? Does the function of the building conform with the educational expectations of the staff and community, as well as those of society in general? Can the cost of bringing a given facility up to contemporary educational standards be estimated in a valid manner? Several areas are important in assessing the educational condition of a school building. Such an appraisal includes seven components:

1. School site;
2. Structural and mechanical features;
3. Maintainability;
4. Safety;
5. Instructional adequacy;
6. Educational environment;
7. Compliance with all applicable regulations (e.g., the Americans with Disabilities Act).

School site. The school site is an integral part of the educational facility. It must be centrally located and able to support all activities important to the school and the community.

Structural and mechanical features. Structural and mechanical features are a vital part of the educational facility. Features must meet local and state codes and be used to evaluate the overall condition of the building to indicate potential costs for improvement and renovation for energy conservation concerns.

Maintainability. To preserve and protect a structure, the facility should be relatively easy to maintain. Maintainability examines those aspects of the school structure that can extend the useful

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life of the facility and the costs of such maintenance.

Safety. Student and staff safety is a primary concern for school administrators. The safety of the building and the school site must be evaluated to indicate potential problem areas and needed remediation. Safety issues concern the site, the structural design, building contents, and materials used in construction.

Instructional adequacy. This area reflects the basic function of the facility to educate students. How does the educational program relate to the physical structure of the building? Data collection focuses on room sizes, room locations, storage and work areas, and all other special learning environments.

Educational environment. The environment of the school facility describes the facility's learning atmosphere. This involves questions ofcolor, attractiveness, temperature, landscaping, and explores the degree to which students, staff, and community members use the facility for noninstructional activities.

Compliance with all applicable regulations. School facilities should be accessible to the general public and specifically to students, teachers, parents, and patrons—regardless of particular handicapping conditions. The Americans with Disabilities Act stipulates many areas of concern for school facilities, and these regulations affect the condition, accessibility, and utilization of the overall facility. The school building must be in compliance with the Act, but the effectiveness of the compliance measures affects the instructional program offered to exceptional students and limits building utilization for noninstructional events, such as community meetings, concerts, and plays.

To more fully examine the condition of educational facilities, the replacement cost index (RCI) was developed, on the basis of certain financial factors. The index, developed by Honeyman in 1985 and subsequently applied by Devin (1985), Honeyman, et al. (1989), Burns (1990), and Lopez (1992), addresses the issues of historic cost versus current replacement cost ratio analysis to approximate the condition of educational facilities. The RCI is calculated as follows:

$$RCI = \frac{OC + (I1 + I2 \ldots In) + DM}{RC}$$

Where:

OC is the original cost of the facility;

I1 to In are the costs of major improvements to that facility;

DM is the current level of deferred maintenance; and

RC is the current replacement cost of the structure.

All original and improvement costs are given in historic dollars, whereas current replacement cost is in current dollar value.

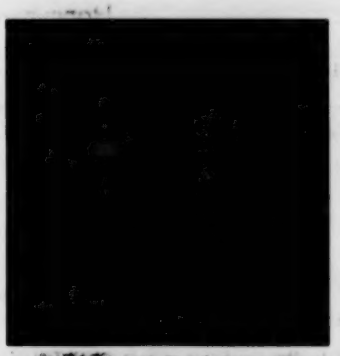
Honeyman and Stewart (1985) found that in addition to the RCI data and deferred maintenance problems, constant changes imposed by different levels of government affected the need for facilities and maintenance. Honeyman and Stewart also found that government mandates, such as asbestos abatement, access for the handicapped, and stringent safety and fire code compliance, placed even greater pressures on public school districts.

Several studies have estimated the condition of school facilities in school districts across the United States. Honeyman, et al. (1989) found that 16 percent of the buildings they surveyed were inadequate for current student populations and new curricular programs. The Education Writers Association (1989) reported that 25 percent of the buildings in their sample were unsuitable and that in 1993, one in eight buildings was "indigent" (1993).

The results of these studies further indicated the need for new construction and renovation of many existing structures throughout the Nation and cited an overwhelming inability of small and rural school districts to fund capital outlay at levels needed to keep educational facilities adequate for current and projected student and staff enrollments. Occupational Safety and Health Administration regulations, as well as access requirements for special and handicapped populations, were also noted, as 7 percent of the buildings were classified "unsafe" and nearly 34

percent of the facilities were not accessible to handicapped students and adults (Honeyman et al. 1988). Furthermore, an estimated 5.5 million students are housed in substandard school buildings (American Association of School Administrators, 1993). These studies suggest that school buildings are deteriorating rapidly and maintenance needs are increasing. Because most states do not provide equalization aid in large proportions to local school districts for facility purposes, costs for improvements and replacement of obsolete buildings generally fall to the local property tax capital outlay levies.

Many states are studying school facility issues. Studies by Burns (1990) and Lopez (1992) confirmed the effectiveness of public school facility investigations in New Jersey and community college facilities in Florida. Other state reports contain similar data; in West Virginia, a trial judge in *Pauley v. Kelly* (1982) described schools throughout the state as deplorable, exhibiting serious health hazards, inadequate heating, and substantial disrepair. The court identified the principal causes of the poor conditions of West Virginia school facilities as the total inability at the state level to finance facility construction, and the problems inherent in the property tax levy system.



There also appears to be a growing concern among the courts regarding the ability of school districts to provide adequate facilities. References to capital outlay have been made in numerous court cases. In Arizona, in *Shofstall v. Hollins* (1973), funds for capital improvements were more closely tied to district wealth than were funds for operating expenses, and the capacity of a school district to raise revenue by bond issues was a function of assessed valuation. In New Jersey a court trying *Robinson v. Cahill* (1973) noted that the state's obligation to provide educational opportunity included capital expenditures. In California, in *Serrano v. Priest* (1976), provisions were made for deferred maintenance funds. In Ohio, in *Board of Education v. Walker* (1979), the court opined that a thorough and efficient system of education was not met if any school had a need for teachers, funds, buildings, or equipment. A trial court in Colorado also showed concern for capital outlay funding in *Dent v. State Board of Education* (1977), stating that some districts were better able than others to provide adequate facilities. Also in Colorado, in *Lujan v. State Board of Education* (1982), the court concluded that the fiscal capacity of school districts to raise revenue for bond redemption and capital reserve was a function of local school district property wealth.

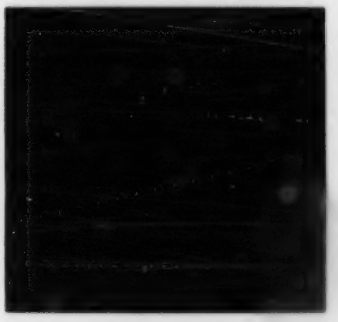
Instructional Concerns and School Facilities

Any study of the conditions of public school facilities must consider appropriateness of facilities to educational programs. In the past, school buildings were constructed with little regard to changing trends in educational programs, but the role of the school facility in the educational process began to be defined in 1979 (Weinstein 1979). Today, educational facility planners design schools to fit programs and to enhance the educational operation. An important relationship exists between an instructional program and its physical environment (Eubanks 1985). Eubanks' criteria for evaluating school facilities included determining adequacy of the facility to house the prescribed program of instruction, identifying features that added or detracted from the program, and identifying major deficiencies in the facilities. Eubanks contended that evaluation of these factors and competent planning can result in a facility that enhances learning, increases teaching efficiency, and minimizes building deterioration. In an Educational Research Service (1985) summary on effective schools research, maintaining adequate facilities was found to be important in these schools. Reeves (1985) found that better student learning is achieved as a result of improved aesthetic environment.

As a member of the National Governors' Association Task Force on School Facilities, Swinden (1986) reported that states have a responsibility to ensure a healthy and safe environment for students, who are required by law to

attend school. Furthermore, students should be entitled to a facility free from drafts, noise, heat or cold, and general disrepair, which impede their opportunity to learn.

In a University of Michigan Research Institute project (Larson 1971), no proof or support was found for the belief that physical environment was an important factor in each child's learning. However, Earthman (1985) wrote 14 years later that conventional wisdom in the area of school plant planning and design indicated that physical environment did have an effect on behavior, achievement, and performance of students and teachers, but this belief could not be empirically demonstrated. Rossmiller (1987), in a review of resource allocation research, found that adequate facilities and instructional materials were necessary for school efficacy, but concluded that fine facilities and abundant materials alone would not ensure school effectiveness.



One widely distributed study (Education Writers Association 1989) of five urban school districts concluded that the physical condition of the school buildings was:

1. Not dependent on school grade level;
2. Not dependent on building age;
3. Dependent on the condition of the neighborhood surrounding the school;
4. Dependent on the district policy role;
5. Dependent on the principal's leadership; and
6. Dependent on timely renovation and regular preventive maintenance.

Teachers interviewed in this study stated that the physical condition of the building had direct positive and negative effects on teacher morale, sense of personal safety, feelings of effectiveness in the classroom, and the general learning environment. Verstegen (1988) found that although there is little or no research regarding the relationship between student learning and facilities or physical plant and teacher satisfaction, some educational facility planners contended that:

> "...building new schools could provide the key to true restructuring of education, as current structural arrangements are redesigned to better provide the workplace and learning conditions which foster excellence, equity, and renewal in the education sector."

Certain patterns for the future are reasonably clear for the United States. The national debt and other pressing social issues, will undoubtedly put greater pressure on resolving the issues of rebuilding the infrastructure of public education.

These future trends have implications for school facilities. The openness of future curriculum and learning arrangements, extended care for children, and extensive new technologies make it necessary to examine the impact of probable future directions in education on student environment.

Technology represents a major challenge to facility planning. Thompson, et al. (1994) discuss emerging opportunities, such as the need for fiber-optic cables and digital switching capabilities to support high-band-width networking, wherein retrofitting school buildings in the future will be more costly. Schools in Orange County, Florida, for example, are being equipped with fiber-optic digital teaching stations in conjunction with T111 and Switch 64 network capabilities. In Scott County, Kentucky, with help from Toyota, a high-tech elementary school is being built with a telephone and computer network, and classrooms will have telephone and computer telecommunication capabilities. Teachers will be able to beam in programs via a downlink satellite dish, and the school will have a video switch and modular telephone circuit. The media center will be linked to each instructional area, and the science labs will be operated with interactive software downloaded to each student. Media centers will have video disks, CD-ROMs, satellite programs, on-line information services, and a schoolwide compressed video television system.

Christopher (1988) identified a number of trends for future educational designs, including

participatory design, designs that reflect teacher professionalism (e.g., workspaces), extended use (day care, adult education, senior citizens), learning style flexibility, communications links throughout the school interlinking with the outside world, and flexibility to adapt to future technologies and changes at minimal cost.

Babinau (1989) discusses the facility characteristics that enhance student learning, such as enhancing teacher professionalism, adapting to a variety of learning styles, fostering communication, and being an integral part of the community. Babinau applied a number of societal trends to the facility process and drew a number of implications. The shift to an information society emphasizes communication skills and the use of information tools, such as computers and artificial intelligence; the world economy newly emphasizes intercultural studies and foreign languages. The shift from an industrial to a service-based economy has resulted in an emphasis on critical-thinking skills and interpersonal responsiveness to others in the workplace. Changes in family structures have placed schools in a position of helping children adjust and understand complex value structures. Environments need to be inviting, affirming, aesthetic, healthful, and intelligent.

A number of these trends have emerged that will help shape the future of educational facility design. The classroom itself will change as the uniform "box" for 30 students will be replaced by a mix of large and small rooms where students learn in large and small groups; interior spaces will be created with maximum flexibility to be opened or closed and always unencumbered; and sophisticated electrical and mechanical systems will allow open and subdivided spaces. Schools will also be designed differently for different climates. Lighting, high-technology learning stations, and communication devices will contribute to a new school facility and use passive and active energy designs as more specialized buildings reflect the popularity of the magnet school and its specialized function and child care centers.

Public school districts must be in a position to analyze the degree to which school facilities can be altered to accommodate effective new strategies for instruction delivery. In addition to measuring an existing school facility's current condition and suitability for instructional delivery, a thorough school building inventory must measure the extent to which the structure can house future programs.

Although there is still no empirical research evidence showing a direct relationship between the physical environment of school facilities and student achievement, planners of school facilities and educators hold a consistent published view that a relationship between environment and student achievement exists, which could provide the key to restructuring education.

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Defining and Measuring Opportunity to Learn

Andrew C. Porter
University of Wisconsin, Madison

About the Author

Andrew C. Porter is a professor of educational psychology and director of the Wisconsin Center for Education Research at the University of Wisconsin-Madison. From 1967 to 1988, he was on the faculty at Michigan State University, where he served as associate dean for research and graduate study and co-directed the Institute for Research on Teaching. From 1973 to 1976, he was affiliated with the National Institute of Education in Washington, D.C., first as a visiting scholar and finally, as associate director for Basic Skills Research.

Dr. Porter has published in the areas of research on teaching; education policy analysis; student and teacher assessment; and psychometrics—especially the problem of measuring change. Funding for his current work comes from the Office of Educational Research and Improvement. He has served on the editorial board for eight professional journals (four published by the American Educational Research Association (AERA), including, currently, the *American Journal of Education* and the journal of *Educational Evaluation and Policy Analysis).* He is a member of several national advisory boards and committees (e.g., The Educational Testing Service's Teacher Programs Council and the National Academy of Sciences Board on International Comparative Studies), and has provided leadership for professional organizations (e.g., eight AERA offices, including Program Chair for the 1990 annual meeting and Council Member-at-Large from 1992-94).

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Defining and Measuring Opportunity to Learn

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Introduction

Sometime between the summer of 1992 and the summer of 1993, school delivery standards faded from view, only to be replaced by opportunity-to-learn standards. The origins of the apparently short-lived school delivery standards can be found in the National Council on Educational Standards and Testing's (NCEST) report, *Raising Standards for American Education* (1992): "School delivery standards should set out criteria to enable local and state educators and policymakers, parents, and the public to assess the quality of a school's capacity and performance in educating their students in the challenging subject matter set out by the content standards" (p. E-5). In contrast, the concept of opportunity to learn has a 30-year history, with origins in Carroll's model of school learning (1963) and recent visibility as an explanatory variable in international assessments of student achievement (McKnight et al. 1987).

The purpose of this paper is to define opportunity to learn, to sketch alternative strategies for measuring opportunity to learn and comment on their relative utility, and finally, to illustrate the value of opportunity to learn as a key indicator in a system of school process indicators. To understand the utility of opportunity-to-learn information for school reform, however, it is first necessary to understand the context in which opportunity-to-learn standards have been introduced. This paper begins by providing that context.

What Is the Goal?

Sometime during the 1980s, a new and unprecedentedly ambitious curriculum reform began. The goal of that reform has been characterized as hard content for all students (Porter et al. 1990). Basic skills are no longer sufficient; all students must possess deep conceptual understanding, which they can use to solve novel problems and to reason. The most visible origins of this curriculum reform are the National Council of Teachers of Mathematics' (NCTM) *Curriculum and Evaluation Standards for School Mathematics* (1989) and the American Association for the Advancement of Science's *Science for All Americans* (1989). Curriculum standard-setting activities are now under way in most other subject areas. Systemic reform is the strategy that has emerged for achieving this massive shift in the curriculum of American schools away from a

heavy emphasis upon facts and low-level skills and toward a better balance with problem solving and reasoning (Smith and O'Day 1990). States and school districts are to put in place comprehensive and coherent curriculum policies including curriculum frameworks aligned to the reform, instructional materials aligned to the frameworks, and staff development to persuade teachers and provide them with the knowledge and skills necessary for implementation. Most important, systemic reform is to include new student assessments aligned to the ambitious frameworks. Students are to be held accountable through tying decisions about promotion, graduation, college entry, and job access to performance on these assessments.

The combination of an ambitious curriculum reform with the intention to have high-stakes student assessment aligned to the reform brings into sharp relief an old and continuing concern for fairness and equity. How will the system protect a student who has not had access to a good education? NCEST's answer was school delivery standards, although today's answer is opportunity-to-learn standards. Whatever the name, the idea is the same—to ensure that each student in a school has a good opportunity to learn the knowledge and skills assessed. Of course, opportunity to learn does not translate directly into student achievement. Schools must provide a quality educational experience, and students must apply themselves. Student achievement is a shared responsibility of both the school and the student.

While the motivation for school delivery/opportunity-to-learn standards is clear, important questions remain. What exactly are these standards? Are school delivery standards the same as opportunity-to-learn standards? How can either set or both sets of standards be used to support curriculum reform? How would the standards protect students who have not had access to a quality education?

The last of these questions, student protection, is the most troubling. There is no way to protect a student who has had a poor education. Once that has happened, the individual faces a lifetime of penalties. Not testing the student who has had a poor education might postpone some of the negative consequences, but not in any significant way. Neither will testing help the student who has had a poor education. If they are to strengthen education, assessment and school delivery/opportunity-to-learn standards must play a role in helping ensure that every student has access to a quality education. Until equality of educational opportunity becomes a fact rather than a goal, many people will suffer the consequences of a poor education.

What Purposes Do School Delivery Standards/ Opportunity-to-Learn Standards Serve?

Although school delivery standards were introduced as a mechanism for protecting students from a poor education, there are at least three ways in which this might be done. First, the standards might present a vision of schooling that holds high promise for delivering on the curriculum reform of hard content for all students. Second, the standards might provide a framework for an indicator system that would describe in what ways and to what extent instruction in schools is consistent with that vision. Third, the standards might be the basis for school-by-school accountability.

Accountability

Of the three purposes that school delivery/opportunity-to-learn standards might serve, school-by-school accountability is the least attractive (Porter, in press). Education has a long and not very productive history of having used inputs and processes for holding schools accountable. School accreditation programs and detailed lists of state requirements for school practices

have not had the desired effects. Because school accountability on inputs and processes has not worked, there has been a shift toward school accountability in terms of outputs, that is, what schools produce. Using school delivery/opportunity-to-learn standards for school accountability would shift attention away from outcomes once again, and back to processes.

The idea of using school delivery/opportunity-to-learn standards to protect students through school accountability does not seem workable. If a process were to be devised for certifying schools one at a time based on whether or not they had met school delivery/opportunity-to-learn standards, students in certified schools would presumably be tested and held accountable, while students in uncertified schools would not. Students in the noncertified schools would be promoted from grade to grade, ultimately graduating and hopefully finding jobs, but they would still suffer the consequences of a poor education. For example, what should an employer think when trying to decide between two applicants, one with average test scores and the other with no test scores because that applicant went to a school so weak that it did not meet the delivery standards?

Another possibility would be to call a moratorium on student assessment for student accountability purposes until all schools meet the school delivery/opportunity-to-learn standards. Those who are against student assessment favor this option; they know that the result would be an indefinite postponement of student assessment. Those who believe that student assessment is a crucial piece of systemic reform and that systemic reform is the best hope for accomplishing much-needed curriculum reform view this option as disastrous. Far too many poor and minority students suffer a lifetime of consequences from poor education. These are the very students who stand to benefit the most if curriculum reform is successful.

The debate on whether or not to use school delivery/opportunity-to-learn standards for school accountability is becoming increasingly confused. One reason is that accountability means different things to different people. The different meanings of accountability make for a great deal of miscommunication. I use school-by-school accountability to mean that criteria are set against which schools are measured, and judgments of quality are made on the basis of those measurements, leading to rewards for good performance and penalties for poor performance. If criteria for schools are set and measurements are made but no judgments and consequences follow in a school-by-school fashion, then I call that process description, a purpose served by indicators.

School Process Indicators

There are at least three motivations for creating a system of indicators about school processes (Porter 1991). One is purely descriptive. Schools provide an educational opportunity; they do not directly produce student learning. It is important to know, therefore, about the nature of educational opportunity as a direct policy output of schools. A second motivation is to have indicators of school processes that serve as an evaluation instrument in monitoring school reform. As mentioned above, NCTM's *Curriculum and Evaluation Standards for School Mathematics* calls for major changes in mathematics course offerings. How will we know the degree of success in achieving these changes? A third motivation for indicators of school processes is to provide explanatory information when student output goals are not reached. School process indicators may point to possible causes and thus to possible solutions for inadequacies in school outputs.

School process indicators would provide much-needed information about what types of students are receiving what types of education. Information would be provided at a system level based on a sample of schools, with indicators collected and published on perhaps a 4-year cycle. The indicators would be relatively inexpensive in that they would be based on a sample of schools and not collected yearly. For the same

reasons, they could not be used for school accountability purposes.

Vision

Even more important than serving as a framework for school process indicators, school delivery/opportunity-to-learn standards can provide a vision of good practice. If schools and teachers are to accomplish the massive curriculum reform that grew out of the 1980s, they will need a great deal of support. First and foremost, they will need to have a clear understanding of the changes necessary. School delivery/opportunity-to-learn standards could represent detailed accounts of effective instructional practices and school strategies in support of the goal of hard content for all students. Grounded in research, such standards would guide school reform and staff development. An excellent example is NCTM's *Professional Standards for Teaching Mathematics* (1991).

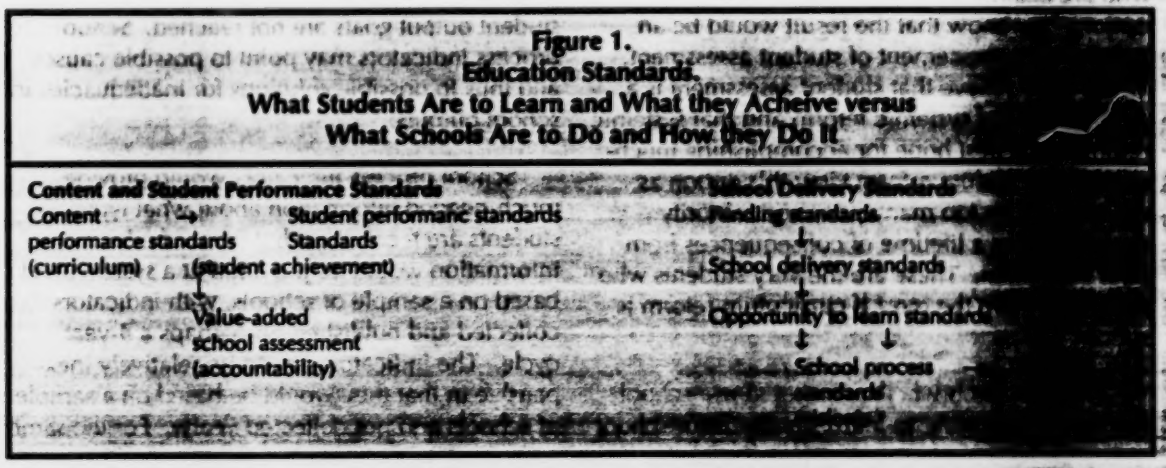
Keeping the Different Types of Standards Straight

Today, the solution to every education problem seems to be a new education standard. First, there were content standards, of which NCTM's *Curriculum and Evaluation Standards for School Mathematics* is the best-known example. Since they were published in 1989, content standard-setting activities have been initiated in virtually every academic subject area. In addition to content standards, there are student performance standards, standards for what students are to achieve. Then there are school delivery and opportunity-to-learn standards, the topic of this paper. I previously suggested replacing school delivery standards with two different sets of standards–school process standards to serve the purpose of creating a vision and school performance standards, which would serve as a framework for school process indicators (Porter, In press). As the different kinds of standards and their purposes multiply, distinguishing among them becomes difficult.

Figure 1 sketches the relationships among several types of education standards. On the right half, separated by the vertical arrows, are school delivery standards, which have to do, in some unclear way, to opportunity-to-learn standards. Above school delivery standards are funding standards, and below opportunity-to-learn standards are school process standards and school performance standards. In the left half of the figure are content standards and student performance standards. The distinction between the left and right halves of figure 1, then, are what students are to learn and achieve versus what schools are to provide and how well.

In distinguishing among the many types of standards, I begin with school delivery standards and opportunity-to-learn standards. While these two types of standards appear to be used interchangeably, they have distinct differences. School delivery standards have no history and so can take on whatever meaning seems useful,

Figure 1.
Education Standards:
What Students Are to Learn and What they Acheive versus What Schools Are to Do and How they Do It



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while opportunity-to-learn standards have a history, and with that history comes a certain meaning. Opportunity to learn describes the enacted curriculum as experienced by the student. In the past, the curriculum emphasized instruction content, particular concepts, skills, and applications to be taught. But opportunity to learn has expanded to include the pedagogic quality of instruction and the resources available to students and teachers as instruction takes place (Porter 1991). However, opportunity to learn does not include organizational features such as school leadership, school goals, parent and community support, and district and state support. Opportunity to learn also excludes quality-of-life factors, such as National Education Goal 6 (that schools should be safe and free from drugs) of the National Goals for Education (U.S. Department of Education 1990).

On the other hand, school delivery standards are more inclusive, encompassing opportunity-to-learn standards as well as National Education Goal 6 and school organizational features. While all parts of school delivery standards are important, opportunity to learn has special value, because content and quality of instruction are the two best predictors of student achievement. These features describe the curriculum reform of hard content for all students and are at the heart of the opportunity-to-learn concept.

School funding is sufficiently important and complicated that it deserves consideration in its own right. Thus, funding standards are placed at the top of figure 1. Obviously, adequate funding is a prerequisite to meeting school delivery and opportunity-to-learn standards. But school funding is important in ways that go well beyond student achievement. Since school attendance in the United States is compulsory, the public is responsible for making school a decent place. Kozol (1991) makes clear that the quality of school life is unacceptable for far too many American schools. Adequate funding, school by school, is a must. To accomplish curriculum reform and provide quality education, a certain level of funding is necessary, though insufficient by itself.

Obviously, schools cannot be held accountable for their funding levels, but they can be held accountable for the uses they make of the funding provided. Without adequate funding, a vision of good instruction is beyond reach, monitoring school practices for descriptive purposes is a waste of time, and holding schools and students accountable for what they produce is unfair. Funding is a continuous variable, however, not a dichotomy of adequacy or inadequacy. Schools must do their best with what they are given, and students must do their best with the opportunities they are provided. Just as I will argue later that student assessment cannot wait until opportunity to learn is guaranteed, neither can school delivery/opportunity-to-learn standards wait until adequate funding is provided.

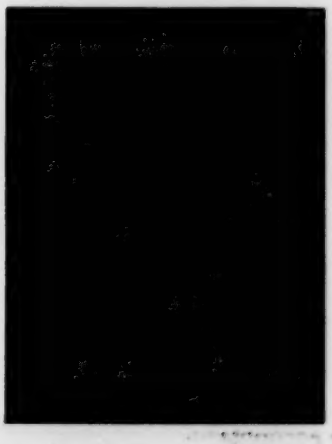


Figure 1 shows school delivery and opportunity-to-learn standards as precursors of school process standards (to serve the purpose of vision) and school performance standards (to serve the purpose of practice description). The distinction between school process standards and school performance standards reflects the difficulty of putting all aspects of a comprehensive vision of good practice into measurable terms. In NCTM's *Professional Standards for Teaching Mathematics*, 45 pages of narrative provide principles (not prescriptions) to guide the design of instruction necessary to teach effectively the curriculum outlined in NCTM's *Curriculum and Evaluation Standards for School Mathematics*. The pragmatics of measurement required for indicators or accountability must not become the lowest common denominator for a vision of what is wanted. Unimpeded by the requirement of being measurable, school process standards can serve to inspire practitioners to be the best that they can be. In contrast, school performance standards lead to measurable indicators for purposes of much-needed descriptions of school practices. One set of standards cannot serve the two different purposes of vision and description.

On the far left side of figure 1 are content standards that describe the desired curriculum. Content standards provide a vision of student accomplishment in that school process standards provide a vision of school practices. Content standards lead to student performance standards and frameworks for student assessments just as school process standards lead to school performance standards and frameworks for school process indicators.

At the bottom left of figure 1 is value-added school assessment—an approach to school-by-school accountability. While the technical details of value-added school assessment are many and complicated, the concept is straightforward: schools are held accountable for the value that they add to student achievement. A measure of baseline student achievement is required as well as subsequent measures of student achievement as students progress through school. For purposes of equity, value-added school assessment should be disaggregated by race (and/or socioeconomic status) and by sex to see whether the school has similar added value for all students. South Carolina is one state where value-added school assessment has been used for school accountability. South Carolina schools with high-added value receive additional funds for instruction, and staff in those schools receive salary bonuses.

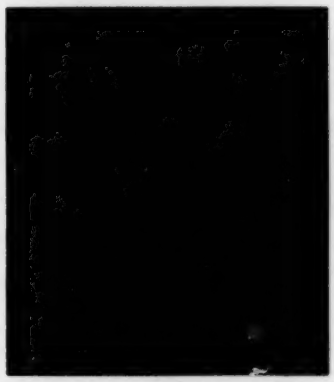
Value-added school assessment has several advantages over school delivery standards for school-by-school accountability (Porter, in press). Value-added school assessment keeps the focus on outcomes, where it belongs. The difficulties of measuring the success of value-added school assessments are challenging, but they are nowhere near as complicated as those for school performance standards, nor is value-added school assessment as expensive. Value-added school assessment avoids telling schools how to do their business, staying away from the type of micromanagement that school performance standards would invite. Last and most important, value-added school assessment reflects the fact that student achievement is a responsibility of both the student and the school. Holding students and schools simultaneously accountable for the same output ensures that neither will be forced to take sole responsibility for what is only partially under their control. Of course, for value-added school assessment to serve as a useful mechanism in supporting the school reform of hard content for all students, student achievement must be measured in a way that is consistent with the reform goal, and school accountability must be based on results disaggregated by race and/or socioeconomic status and sex.

Opportunity-to-Learn Indicators

Because the number of candidates for school performance standards is so large, some criteria are needed for deciding which to measure. If an index of opportunity to learn is wanted, then the criterion for establishing priority should be utility for predicting student learning (achievement). The best predictors of student achievement are the properties of instruction: its content, its effectiveness, its recipients, and its applicable standards of achievement.

Fifteen years ago, I began a line of research to model teachers' content-related decisionmaking processes. On the one hand, this work focuses on teachers' classroom behaviors and the opportunities to learn that they provide their students. On the other hand, this work focuses on the factors that influence teachers' decisions about what to teach and how to teach. The research has required creating a language for describing opportunity to learn. The language had to support comparisons among teachers and among courses on the enacted curriculum. The language also needed to allow for comparisons in a criterion reference sense (for example, against the content standards of the National Council of Teachers of Mathematics or against state and district curriculum frameworks).

The early work centered on the decisions teachers of elementary school mathematics make regarding opportunity to learn. Although the focus was on modeling teacher decisionmaking, the work revealed an elementary school mathematics curriculum that was badly out of balance, emphasizing factual knowledge to the near exclusion of developing conceptual understanding and problem-solving skills (Porter 1989). Prior to that time, the empirical basis for knowing what is taught in elementary school mathematics was surprisingly weak. The research was recently extended to include the modeling of influences of state and district standard-setting activities on the enacted curriculum in high school mathematics and science courses. The languages developed for describing opportunity to learn in high school mathematics and science, and the measurement strategies for using those languages to describe the enacted curriculum in high school mathematics and science courses, illustrate an approach to implementing school performance standards and creating a national system of opportunity-to-learn indicators.



A Language for Describing Opportunity to Learn

A language for describing opportunity to learn can be represented by two four-dimensional taxonomies, one for mathematics and one for science (appendixes I-III). In developing these languages, textbooks and reports from professional organizations (for example, the NCTM *Standards*, AAAS's *Science for All Americans*) were consulted. Additionally, professors of mathematics, mathematics education, science, and science education at the University of Wisconsin-Madison and teachers in the Madison school system were consulted. In the case of mathematics, the California *Mathematics Framework* and *Model Curriculum Standards* (California State Board of Education 1985a,1985b) and the Wisconsin mathematics framework (Wisconsin Department of Public Instruction 1986) were consulted, as well as the *Mathematics Objectives: 1990* of the National Assessment of Educational Progress (NAEP) mathematics objectives (Educational Testing Service 1988). In the case of science, the California *Science Framework* was consulted (California State Board of Education 1989), as were the Welsh [U.K.] Framework (Department of Education and Science 1988), the National Center for Improving Science Education frameworks (Bybee et al. 1989), the National Science Teachers Association's *Essential Changes in Secondary School Science* (Aldridge 1989), Klopfer's (1971) content taxonomy, and Miller's (1986) *An Analysis of Science Curricula in the United States.*

The first two levels of each taxonomy, Dimensions A and B, describe what comes first to most people's minds when they think about mathematics or science content. In mathematics, Dimension A has 10 levels: number and number relations, arithmetic, measurement, algebra, geometry, trigonometry, statistics, probability, advanced algebra/precalculus/calculus, and finite/discrete mathematics. For science, Dimension A has eight levels: cell biology, human biology, biology of other organisms, biology of populations, chemistry, physics, earth and space science, and general science. Dimension B is nested within Dimension A, representing further breakdowns of each general content area, with 10 or fewer levels of B within each level of A. For example, in mathematics, levels of B within statistics include collecting data, distributional shapes, central tendency, variability, correlation or regression, sampling, point estimates of parameters, confidence interval estimates of parameters, and hypothesis testing. In science, levels of B within biology of other organisms include diversity of life, metabolism of the organism, regulation of the organism, coordination and behavior of the organism, reproduction and development of plants, reproduction and development of animals, heredity, and biotechnology.

Dimensions C and D are the same for both science and mathematics taxonomies. Dimension C represents the modes of instruction and has seven levels: exposition, pictorial models, concrete models, equations/formulas, graphs,

laboratory work, and field work. Dimension D represents the levels of knowledge or skills that students are expected to acquire as a result of instruction. It has nine levels: memorize facts/definitions/equations; understand concepts; collect data; order, compare, estimate, approximate; perform procedures; solve routine problems, replicate experiments, replicate proofs; interpret data, recognize patterns; recognize, formulate, and solve novel problems/design experiments; and build and revise theories/develop proofs.

A mathematics or science topic is defined by the intersection of the four dimensions of the taxonomy. In mathematics, there are 5,922 possible topics, while in science there are 4,284 possible topics (appendixes I-III).

Each taxonomy reflects several compromises in attempting to build a common language for describing content among teachers and across courses. For some teachers in some cases, the taxonomies fail to make important distinctions, and in other cases, they make distinctions finer than seems necessary. By having Dimensions C and D common across mathematics and science, the taxonomies create languages that can address such questions as whether current recommendations for "active learning" (NCTM *Standards* 1989; Rutherford and Ahlgren 1990) are more successful in one subject than in another. Finally, while each taxonomy allows for descriptions at the level of a specific topic, descriptions at the level of taxonomy marginals are more useful.

Measuring Opportunity to Learn

Log Procedures. One way to measure opportunity to learn is through teacher logs. A teacher completes one daily log form for each day of instruction for an entire school year. The form consists of two sides of a single sheet of paper (appendix IV). The first side focuses on the content of instruction; the second side focuses on pedagogic practices. After indicating their school and name and the day's date, teachers check whether all students studied the same content for Question 1 that day. If not, they are instructed to describe content for a student near the average of the class. Question 2 asks teachers to indicate, in number of minutes, the portion of that class period spent on activities not directly related to the academic content of the course (announcements, attendance).

The remainder of the front side of the log, Question 3, is devoted to describing the content of instruction. Teachers are asked to indicate up to five topics of content covered in that class period. Three pieces of information are required for each topic. First, the teacher gives an example or brief description of the topic. Next, the teacher writes a four-digit code, positioning the topic within the taxonomy previously described. The first digit indicates the Dimension A level, the second digit the Dimension B level, the third digit the Dimension C level, and the fourth digit the Dimension D level. Since each dimension of the taxonomy is restricted to 10 levels, and since the first level is coded "0," the four-digit content code is possible. The third piece of information is the topic emphasis. A "3" indicates that the topic was either the only one emphasized in the period or received at least 50 percent of the time for that class. A "2" indicates the topic was one of two to four topics that day, all of which were emphasized. A "1" indicates the topic was important but not strongly emphasized in that class.

The back of the log form contains four questions describing instructional method. Question 4 asks teachers to indicate the modes of instruction used: lecture, demonstration, recitation/drill, whole class discussion, students working in pairs/teams/small groups, and students working independently. For each of these modes, the teacher circles an emphasis code having the same definitions as for a content topic, but including "0" to indicate "not used." In Question 5, a teacher indicates the types of activities students engaged in: listening/taking notes, discussing/discovering within the context of a lesson, completing written exercises, taking a test, writing a report or paper, conducting lab or field work, and presenting/

demonstrating. Again, there are four options to circle for emphasis, 0 through 3. In Question 6, the teacher indicates instructional materials used: primary text, primary workbook, supplementary text, teacher-made assignment/exercise, lab/manipulatives/equipment (not computers or calculators), computers, calculators, other material, and test. Page numbers and workbooks of textbooks are to be indicated, and a distinction is to be made between teacher-made tests and district- or publisher-developed tests. Teacher-made tests are to be attached to the log. The final question, 7, elicits homework assigned, with options from no assignments to several, and space to indicate the type of homework. No attempt is made to characterize the amount of homework.

Each teacher receives a log guide manual. Prior to using the logs, each teacher receives approximately 1 hour of instruction in the opportunity-to-learn language. Logs are completed by teachers daily and sent for editing and entry into a central database weekly. Emphasis codes are translated into proportions of time and aggregated to the level of a school year.

Quality of Log Data. Forty-eight teachers who kept daily logs were observed, with 14 observed twice, creating 62 observation logs paired with independent teacher logs. These 62 pairs of logs were used to calculate agreement for reporting the content of instruction on Dimensions A, B, C, and D of the taxonomies. Agreement was defined as the number of times the teacher and the observer agreed, divided by the number of opportunities for agreement and averaged across all pairs of log/observation data. For Dimension A, agreement was 0.78; Dimension B, 0.68; Dimension C, 0.67; and Dimension D, 0.59.

The relatively high levels of agreement are especially impressive when one realizes that they describe a single lesson; all analyses of log data are based on aggregations to a full school year with the median number of lessons being 165. Obviously, the stability and reliability of such aggregations are much higher than for an individual lesson, just as the reliability of a test based on the sum across 100 items is much higher than the reliability of any one item.

There are other factors that make these levels of agreement impressive. The content of instruction is, to some degree, a matter of perception filtered by pedagogic quality and intentions. Further, only five topics are listed for a day's instruction in a course section. Where more than five topics are covered, there is the possibility of the observer's five topics differing from those of the teacher. Finally, the several dimensions of the taxonomies make a large number of distinctions that, in the normal course of instruction and its continuous flow, can blend at the edges of their meanings. The method of calculating agreement reported here does not allow for degrees of agreement. Either the observer and the teacher reported exactly the same level of a dimension of a topic, which was counted as agreement, or they did not, which was counted as disagreement.

Questionnaire Data. Measuring opportunity to learn using teacher logs provides high-quality information on the enacted curriculum, information that agrees remarkably well with independent classroom observations. But the procedure is expensive. Completing a teacher log requires a teacher to spend approximately 5 minutes of time each day. Teachers must be taught to use the language for describing the enacted curriculum. Data must be collected as they are generated, or teachers fall behind. Furthermore, creating an analysis file with quality edits takes time. To extend the sample of courses and teachers beyond what could be afforded with log data, a questionnaire survey was used in the study of high school mathematics and science. The questionnaire asked teachers to indicate the amount of time they spent on the various topics identified by Dimensions A and B in the taxonomy and, for each A and B topic covered to at least some extent, the depth of coverage.

For the sample of teachers who also kept daily logs, agreement between the two measurement strategies can be calculated. For math, correlations are based on a sample size of 24, and for science, a sample size of 27. Correlations between log and questionnaire data on the amount of time devoted to each of the 10 levels of Dimension A in mathematics were: 0.42, 0.29, 0.25, 0.76, 0.93, 0.92, 0.50, -0.05, 0.80, and 0.59. Levels of agreement for the first three levels of A were lower than for other levels of A, perhaps because number and number relations, arithmetic, and measurement are less self-contained and more integrated with other content areas than are other topics, and so more difficult to report accurately in a questionnaire format. Dimension A7—probability—had essentially a zero correlation between logs and questionnaires, but probability was not taught by any of the teachers. Correlations indicating agreement between questionnaire and log data for the eight Dimension A content areas of science were: 0.71, 0.61, 0.78, 0.62, 0.66, 0.81, 0.88, and 0.32.

Dimension C data were not collected in the questionnaire, but variations on Dimension D data were. While there are nine levels of Dimension D in the log data, the questionnaire asked about only four levels, only two of which were in close definition agreement between the questionnaire and log data. For these two instances of comparable definition, the correlations were moderate: memorizing facts, with a correlation of 0.48, and emphasis on novel problems, with a correlation of 0.34.

Other comparisons between questionnaire and log data were possible. For example, the amount of time spent in lecture correlated at 0.41, the amount of time in class discussion correlated at 0.63, the amount of time in small groups correlated at 0.42, and the amount of ti with students working independently correlated 0.47.

Given that the questionnaire data asked teachers to reflect on a semester of instruction but the log data covered an entire school year, and given that the metrication for reporting amount of time on a topic differed between the two procedures, these correlations are encouragingly high. Based on experience with questionnaire design and use, it now seems quite possible to create a questionnaire in which agreement between log and questionnaire data would be significantly higher. Thus, teacher self-reporting through questionnaire survey seems a promising and less expensive alternative to teacher logs as a strategy for measuring opportunity to learn.

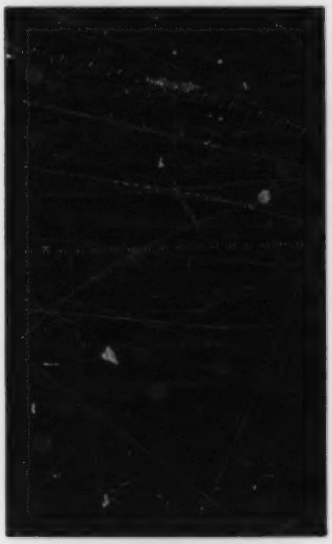
Portfolio Assessment. The New Standards Project is in the beginning stages of designing portfolio assessment. While the emphasis of that work is on measuring student achievement, the activity may also be useful in defining opportunity to learn. If a portfolio is a representative sample of the work that a student has done, then content analysis of a student's portfolio would be a valid representation of that student's opportunity to learn. If a portfolio is a collection of a student's best work, then content analysis of the student's portfolio would make instruction look better than it really was.

Using portfolios to define opportunity to learn is just an idea in infant stage at this point. When developed, however, it might hold great promise. Content analyses of student work are likely to be more costly than either questionnaire data or teacher logs. Assembling the material for portfolios represents a significant investment of teacher time, and content analyses of instructional materials are difficult and time-consuming as well. Instructional benefits might offset a portion of these measurement costs.

The Usefulness of Opportunity-to-Learn Indicators

Results from a study of standard-setting efforts of states and districts on the enacted curriculum in high school mathematics and science courses

illustrate the kinds of information and insight that opportunity-to-learn indicators provide. The study involved all math and science teachers in 18 high schools (grades 9 through 12) in 12 districts in six states. In each state, one large urban district was matched with one smaller suburban or rural district. In each large district, two high schools were selected to give a sense of within-district variance. In each school, four teachers' courses were studied intensively, two for mathematics and two for science, yielding a total target sample of 72 focus teachers. The results that follow are based on the 62 teachers for whom daily log information was available for a full school year. The data collection period consisted of the spring semester of the 1990 academic year, and the fall and spring semesters of the 1991 academic year.



Is Content Compromised When Algebra 1 is Required of All Students?

Of the 32 math teachers keeping logs, two taught Algebra 1 in a school where all freshmen were required to take Algebra 1. Some have hypothesized that the influx of less capable students would compromise the quality of the curriculum in such a situation.

Log data revealed that one Algebra 1 class emphasized algebra (as opposed to other content, such as arithmetic) more than did all Algebra 1 courses in the log sample on average. The other Algebra 1 class emphasized algebra only slightly less than did all Algebra 1 courses on average. In looking more closely at the algebra topics emphasized, it was seen that both classes put greater emphasis upon advanced topics than was true for the average of all Algebra 1 classes. The required Algebra 1 course with the greatest emphasis on algebra topics also put an unusually high emphasis on nonlinear equations. The other class placed a higher emphasis on work involving systems of equations, a topic more likely to be taught in Algebra 2 courses than in Algebra 1 courses. Despite the fact that all students were required to take one of them, both classes looked much more like Algebra 1 than prealgebra. Neither looked anything like general math.

Upon extending the analysis of the two required Algebra 1 courses to modes of instruction and intended student outcomes, there was still no evidence that the enacted curriculum had been watered down. The required Algebra 1 class that placed the highest emphasis on algebra also placed a higher emphasis on work involving equations and formulas than did Algebra 1 courses in general. Otherwise, the curricula of the two classes matched those for Algebra 1 courses in general on modes of instruction. Both placed a lower emphasis upon computation than did Algebra 1 courses in general. The class that placed the greatest emphasis on algebra made up for its relatively lower emphasis on computation by stressing student understanding and memorizing facts. The other replaced the typical emphasis on computation with a relatively greater emphasis on work involving problem solving, such as story problems. If anything, this finding represents a stronger curriculum for that class than for Algebra 1 courses in general.

California Math A

California is a state recognized for the similarity of its mathematics framework to the National Council of Teaching Methods. Teachers and the state collaborated to design a new course, Math A, for students who were not quite ready for Algebra 1 but who should not be subjected to general mathematics, a course with a curriculum identical to the K-8 curriculum the students had studied repeatedly but still failed to master. Indicator data can be used to see whether Math A is implemented in alignment with its intentions.

The two sections of Math A in the sample stood out from all other courses studied as having a distinctive dual emphasis on algebra and geometry, with algebra slightly more heavily emphasized. Sixty percent of instruction was in algebra and geometry for one Math A section and 82 percent for the other. Further, both solid and

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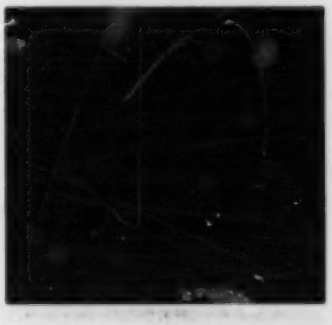
coordinate geometry were emphasized, two topics not emphasized in first-year geometry courses in the log sample.

The finding of a dual emphasis on algebra and geometry is consistent with the Math A course syllabus. However, implementation of that syllabus was not perfect. The 13 Math A course units included instruction in both probability and statistics, but neither of these content areas were reported as taught in either of the two sections. These topics apparently fell victim to other pressures. Adding probability and statistics to the high school mathematics curriculum, as called for in the NCTM *Standards*, may be especially difficult. Little or no probability or statistics were taught in any of the standard math courses in the log sample. That the NCTM curriculum reform had not yet touched traditional math courses was disappointing but not surprising. That probability and statistics were not taught even in Math A, where these content areas were explicitly a part of the plan, was both surprising and disappointing.



Math A stood out not only as distinct from other math courses in its emphasis on algebra and geometry but also as having an unusually high emphasis on mathematical modelling and an unusually low emphasis on lecture. Similarly, the two Math A sections placed unusually high emphasis on collecting data and solving novel problems and put less emphasis on computation. Again, both of these findings are consistent with the design of the course and very much consistent with the curriculum reforms of the late 1980s.

At least as seen in the two Math A sections for which log data were available, Math A represents a unique bridge course opportunity for students. Both the content and the pedagogy of Math A instruction were more consistent with late 1980s curriculum reforms than were the content and pedagogical emphases of other math courses studied. Students taking Math A receive a curriculum that sharply contrasts with that of general mathematics. The Math A curriculum involves learning new content, not just rehashing the K-8 curriculum once again, and it actively engages students in coming to understand mathematical concepts and how to apply them.

Professional Standards and the Enacted Curriculum in High School Mathematics and Science

Dimensions C and D of the taxonomy for describing opportunity to learn allow contrasts between mathematics and science and between those two enacted curricula and the curricula envisioned in such reform documents as NCTM's *Curriculum and Evaluation Standards for School Mathematics* and AAAS's *Science for All Americans*.

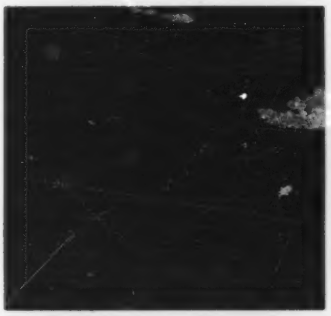
In this study, both mathematics and science were dominated by exposition, either verbal or written, as the primary mode of instruction. In mathematics, exposition was especially high in the lower-level courses, consuming two-thirds to three-fourths of instruction time. In science, reliance upon exposition as the mode of instruction was less predictable, at least by course level. In both subjects, students in virtually all of the course types studied spent the majority of their time either listening to the teacher or working independently at their desks. On average, for both math and science, one-third of the time was spent in "seatwork," while only one-fourth of the time was spent in class discussion and small-group work.

There was very little lab work in either mathematics or science. What little lab work was done in mathematics consisted almost entirely of drill and practice at a computer terminal. In half of the science courses in the log sample, students spent 5 percent or less of instructional time in lab work. The relative emphasis on lab work was specific to a particular course section and did not vary by course type. For example, it was no greater for chemistry courses than for physical science courses. Neither mathematics nor science had any fieldwork to speak of, nor did either subject involve students much in graph work, with only 1 percent of instructional time spent on graph work in science and a surprisingly low 4

percent of instructional time for graph work in mathematics. One bright spot in an otherwise very traditional picture of instruction was the use of pictorial models in science. On average, 15 percent of science instructional time involved pictorial models, with relatively little variance in their use across science course types.

What emerges, then, from the information on modes of instruction is a great deal of lecturing and independent seatwork, with very little emphasis on active engagement of students in the construction of their own knowledge. The gap between actual practice and the curriculum reforms of the late 1980s is especially large here.

The picture for intended student outcomes (What students are to know and do as a result of instruction) parallels the picture seen for modes of instruction. Again the gap is large between the enacted curriculum for high school science and mathematics courses and the desired curriculum as reflected in the curriculum reforms, outlined by professional societies. In mathematics, the emphasis is on understanding and computation (routine procedures), while in science, the emphasis is on memorizing facts and understanding. In mathematics, only 4 percent of instructional time is given to collecting and interpreting data. Only 2 percent of instructional time is devoted to working with novel problems. On average, no instructional time is allocated to learning to develop proofs, not even in geometry. In science, the picture is similar. Essentially no time is allocated to designing experiments or building and revising theory. For one-third of the science courses studied, no time was allocated to data collection and interpretation.



Summary and Conclusions

School delivery standards is an idea that has great potential for furthering the curriculum reform that seeks to ensure hard content for all students. First, school delivery standards could provide a vision for excellence in school practices, especially a vision of instructional practices based on the best that research has identified. School delivery standards could also include statements about the desired quality of life in schools, including National Goal 6, that schools be safe and free from drugs. Opportunity-to-learn standards are best thought of as a subset of school delivery standards that are focused upon the enacted curriculum, the appropriateness of the content taught, and the quality of the pedagogic strategies used.

Funding for education is too important an issue to be buried within school delivery standards. It should become a separate standard in its own right. Adequate funding is necessary not only to create the resources for schools to deliver quality instruction, but to ensure that the quality of life in schools is acceptable.

Opportunity-to-learn standards, as a subset of school delivery standards, have great potential for creating a framework for opportunity-to-learn indicators. Such indicators would be useful for monitoring the implementation of school reform, seeing, for example, in what ways and to what extent the NCTM curriculum standards are being implemented.

Within the context of monitoring the enacted curriculum of high school mathematics and science courses, teacher logs and teacher questionnaires are measurement strategies with great potential. Teacher logs provide data on the enacted curriculum in high agreement with independent reports from classroom observations. Questionnaire data, in turn, correlate well with teacher log data, but with substantially less cost and subject burden.

The utility of opportunity-to-learn indicators was illustrated by the finding that the requirement of students to take Algebra I courses does not necessarily result in a watered-down curriculum for those courses. The opportunity-to-learn indicator data were also useful in monitoring the California curriculum reform called Math A. Results showed that the enacted curriculum in

Math A courses differed substantially from other math courses and was quite consistent in important ways with the intended curriculum for Math A. The opportunity-to-learn indicators revealed that, in general, the enacted curriculum in high school mathematics and science classes is far removed from the curricula envisioned by today's curriculum reform. Obviously, bridging the gap between standard practice in today's high school mathematics and science classes and the vision we hold for them will require massive efforts. As these efforts are undertaken, a national system of opportunity-to-learn indicators could be used to monitor the implementation process, identify successes, and point to places where greater effort is needed.

Using school delivery standards or opportunity-to-learn standards for school-by-school accountability is not recommended. Schools should be held accountable for the value they add to student achievement. This will keep the focus on outcomes, where it belongs; leave strategies and procedures up to schools, where they belong; and show that student achievement is a shared responsibility between students and schools by holding schools and students simultaneously accountable for student achievement.

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APPENDIX I.
Mathematics Content Codes

Dimension A: 0. Number and Number Relations

Dimension B:

0. Sets/classification
1. Whole numbers
2. Ratio and proportion
3. Percent
4. Fractions
5. Integers
6. Exponents
7. Decimals (including scientific notation)
8. Real numbers (rational/irrational)
9. Relations between numbers (order, magnitude)

Dimension A: 1. Arithmetic

Dimension B:

0. Whole numbers
1. Ratio and proportion
2. Percent
3. Fractions
4. Integers
5. Decimals
6. Exponents
7. Radicals
8. Absolute value
9. Relationships between operations

Dimension A: 2. Measurement

Dimension B:

0. Time (not arithmetic, but units)
1. Length
2. Perimeter
3. Area
4. Volume (including capacity)
5. Angle
6. Weight
7. Mass
8. Rates (including derived and direct)
9. Relationships between measures

Dimension A: 3. Algebra

Dimension B:

0. Variables
1. Expressions
2. Linear equations or inequalities
3. Nonlinear equations or inequalities
4. Systems of equations or inequalities
5. Exponents or radicals
6. Sequences or series
7. Functions (polynomial)
8. Matrices

Dimension A: 4. Geometry

Dimension B:

0. Points, lines, segments, rays, angles
1. Relationship of lines; relationship of angles
2. Triangles and properties (including congruence)
3. Quadrilaterals (and polygons) and properties (including congruence)
4. Similarity
5. Symmetry
6. Circles
7. Solid geometry
8. Coordinate geometry (including distance)
9. Transformations (informal and formal)

Dimension A: 5. Trigonometry

Dimension B:

0. Trigonometric ratios
1. Basic identities
2. Pythagorean identities
3. Solution of right triangles
4. Solution of other triangles
5. Trigonometric functions
6. Periodicity, amplitude, etc.
7. Polar coordinates

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Dimension A: 6. Statistics

Dimension B:

0. Collecting data
1. Distributional shapes (e.g., skew, symmetry)
2. Central tendency (e.g., mean, median, mode)
3. Variability (e.g., range, standard deviation)
4. Correlation or regression
5. Sampling
6. Estimating parameters—point estimates
7. Estimating parameters—confidence intervals
8. Hypothesis testing

Dimension A: 7. Probability

Dimension B:

0. Events, possible outcomes, trees
1. Equally likely—relative frequency probability
2. Empirical probability (e.g., simulations)
3. Simple counting schemes (e.g., combinations and permutations)
4. Conditional probability
5. Discrete distributions—binomial
6. Discrete distributions—other
7. Continuous distributions—normal
8. Continuous distributions—other

Dimension A: 8. Advanced Algebra/ Precalculus/Calculus

Dimension B:

0. Functional notation and properties
1. Operations with functions
2. Polynomial functions
3. Exponential functions
4. Logarithmic functions
5. Relations between types of functions
6. Matrix algebra
7. Limits and continuity
8. Differentiation
9. Integration

Dimension A: 9. Finite/Discrete Mathematics

Dimension B:

0. Sets (e.g., union, intersection, Venn diagrams)
1. Logic (truth, logical argument forms, sentence logic)
2. Business math (interest, insurance)
3. Linear programming
4. Networks
5. Iteration and recursion
6. Markov chains
7. Development of computer algorithms
8. Mathematical modeling

APPENDIX II
Science Content Codes

Dimension A: 0. Cell Biology

Dimension B:

0. Cell structure
1. Cell function
2. Transport of cellular material
3. Cell metabolism
4. Photosynthesis
5. Cell response
6. Genes

Dimension A: 1. Human Biology

Dimension B:

0. Nutrition
1. Digestive system
2. Circulatory system
3. Blood
4. Respiratory and urinary systems
5. Skeletal and muscular systems
6. Nervous and endocrine systems
7. Reproduction
8. Human development and behavior
9. Health and disease

Dimension A: 2. Biology of Other Organisms

Dimension B:

0. Diversity of life
1. Metabolism of the organism
2. Regulation of the organism
3. Coordination and behavior of the organism
4. Reproduction and development of plants
5. Reproduction and development of animals
6. Heredity
7. Biotechnology

Dimension A: 3. Biology of Populations

Dimension B:

0. Natural environment
1. Cycles in nature
2. Producers, consumers, decomposers. N_2, O_2, CO_2 cycles
3. Natural groups and their segregation
4. Population genetics
5. Evolution
6. Adaptation and variation in plants
7. Adaptation and variation in animals
8. Ecology

Dimension A: 4. Chemistry

Dimension B:

0. Periodic system
1. Bonding
2. Chemical properties and processes
3. Atomic and molecular structure
4. Energy relationships and equilibrium in chemical systems
5. Chemical reactions
6. Equilibrium
7. Organic chemistry
8. Nuclear chemistry
9. Environmental chemistry

Dimension A: 5. Physics

Dimension B:

0. Energy (sources and conservation)
1. Heat (content and transfer)
2. Static and current electricity
3. Magnetism and electromagnetism
4. Sound
5. Light and spectra
6. Machines and mechanics
7. Properties and structures of matter
8. Molecular and nuclear physics

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Dimension A: 6. Earth and Space Science

Dimension B:

0. Physical geography
1. Soil science
2. Oceanography
3. Meteorology
4. Geology
5. Earth's history
6. Solar system
7. Stellar system
8. Space explorations

Dimension A: 7. General

Dimension B:

0. Nature and structure of science
1. Nature and scientific inquiry
2. History of science
3. Ethical issues in science
4. Système International d'Unitis system of measurement
5. Science/technology and society

Dimension C:

0. Exposition—verbal and written
1. Pictorial models
2. Concrete models (e.g., manipulatives)
3. Equations and formulas (e.g., symbolic)
4. Graphical work
5. Laboratory work
6. Fieldwork

Dimension D:

0. Memorize facts/definitions/equations
1. Understand concepts
2. Collect data (e.g., observe, measure)
3. Order, compare, estimate, approximate
4. Perform procedures: execute algorithms and routine procedures (including factoring), classify
5. Solve routine problems, replicate experiments and proofs
6. Interpret data, recognize patterns
7. Recognize, formulate, and solve novel problems; design experiments
8. Build and revise theory; develop proofs

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APPENDIX III
Science Content Taxonomy

	C_0 Exposition Verbal and Written									C_1 Pictorial Models	C_2 Concrete Models	C_3 Equations, Formulas	C_4 Graphic Work	C_5 Laboratory Work	C_6 Field-work
	D_0	D_1	D_2	D_3	D_4	D_5	D_6	D_7	D_8	D_0-D_8	D_0-D_8	D_0-D_8	D_0-D_8	D_0-D_8	D_0-D_8
Biology of the cell (A_0)															
B_0 Cell structure															
B_1 Cell function															
B_2 Transport of cellular material															
B_3 Cell metabolism															
B_4 Photosynthesis															
B_5 Cell response															
B_6 Genes															
Human biology (A_1)															
B_0 Nutrition															
B_1 Digestive system															
B_2 Circulatory system															
B_3 Blood															
B_4 Respiratory and urinary systems															
B_5 Skeletal and muscular systems															
B_6 Nervous and endocrine systems															
B_7 Reproduction															
B_8 Human development and behavior															
B_9 Health and disease															
Biology of other organisms (A_2)															
B_0 Diversity of life															
B_1 Metabolism—organism															
B_2 Regulation—organism															
B_3 Coordination and behavior—organism															
B_4 Reproduction and development—plant															
B_5 Reproduction and development—animal															
B_6 Heredity															
B_7 Biotechnology															

	C_0 Exposition Verbal and Written									C_1 Pictorial Models	C_2 Concrete Models	C_3 Equations, Formulas	C_4 Graphic Work	C_5 Laboratory Work	C_6 Field-work
	D_0	D_1	D_2	D_3	D_4	D_5	D_6	D_7	D_8	D_0-D_8	D_0-D_8	D_0-D_8	D_0-D_8	D_0-D_8	D_0-D_8
Biology of populations (A_3)															
B_0 Natural environment															
B_1 Cycles in nature															
B_2 Producers, consumers, decomposers															
B_3 Natural groups– segregation															
B_4 Population genetics															
B_5 Evolution															
B_6 Adaptation and variation—plants															
B_7 Adaptation and variation—animals															
B_8 Ecology															
Chemistry (A_4)															
B_0 Periodic system															
B_1 Bonding															
B_2 Chemical properties and processes															
B_3 Atomic and molecular structure															
B_4 Energy relationships															
B_5 Chemical reactions															
B_6 Equilibrium															
B_7 Organic chemistry															
B_8 Nuclear chemistry															
B_9 Environmental chemistry															
Physics (A_5)															
B_0 Energy—sources and conservation															
B_1 Heat—content and transfer															
B_2 Static and current electricity															
B_3 Magnetism and electromagnetism															
B_4 Sound															
B_5 Light and spectra															
B_6 Machines and mechanics															
B_7 Properties and structures—matter															
B_8 Molecular and nuclear physics															

	C_0 Exposition Verbal and Written									C_1 Pictorial Models	C_2 Concrete Models	C_3 Equations, Formulas	C_{4a} Graphic Work	C_5 Laboratory Work	C_6 Field-work
	D_0	D_1	D_2	D_3	D_4	D_5	D_6	D_7	D_8	D_0-D_8	D_0-D_8	D_0-D_8	D_0-D_8	D_0-D_8	D_0-D_8
Earth and space science (A_6)															
B_0 Physical geography															
B_1 Soil science															
B_2 Oceanography															
B_3 Meteorology															
B_4 Geology															
B_5 Earth's history															
B_6 Solar system															
B_7 Stellar system															
B_8 Space explorations															
General (A_7)															
B_0 Nature and structure—science															
B_1 Nature—science inquiry															
B_2 History of science															
B_3 Ethical issues															
B_4 SI system of measurement															
B_5 Science/technology and society															

Teacher Name_____

School _____

Date_____

month / day / year

DAILY LOG

1. Did all students study the same content? _____Yes _____No
   If content coverage varied by student, describe content for a student near the class average.

   _____

   _____

   _____

2. Did students go on a field trip? _____No
   _____Yes

   Provide a brief description:

   _____

   _____

   Place of field trip _____

   Purpose _____

3. Describe the content taught/studied. If more than five types of content were covered, indicate the five that were most important:

EXAMPLE OR BRIEF DESCRIPTION OF CONTENT	CONTENT CODE*				EMPHASIS (please circle)		
	D A	D B	D C	D D			
					1	2	3
					1	2	3
					1	2	3
					1	2	3
					1	2	3

Content codes are found in content catalog.

Emphasis Scale: 3 = only content emphasized in the period (more than 50% of lesson)
2 = one of 2-4 types of content emphasized in the period
1 = important content, but not emphasized in this lesson (less than 20% of lesson)

*A content code is a four-digit number determined by the four-dimensional taxonomy of content.

4. What modes of instruction were used?

	EMPHASIS (please circle)			
Lecture	3	2	1	0
Demonstration	3	2	1	0
Recitation/drill	3	2	1	0
Whole-class discussion	3	2	1	0
Students working in pairs, teams, or small groups	3	2	1	0
Students working independently	3	2	1	0

Emphasis Scale: 3 = only instructional mode emphasized (more than 50% of time)
2 = one of 2-6 modes emphasized
1 = used less than 15% of the time
0 = not used

5. Indicate student activity:

	EMPHASIS (please circle)			
Listen/take notes	3	2	1	0
Discuss/discovery lesson	3	2	1	0
Complete written exercises/take a test	3	2	1	0
Write report/paper	3	2	1	0
Lab or fieldwork	3	2	1	0
Present/demonstrate	3	2	1	0

Emphasis Scale: 3 = primary student activity (more than 50% of time)
2 = one of 2-6 primary student activities
1 = less than 15% of student time
0 = not something students did today

6. Indicate instructional materials used (check all that apply):
_____ Primary text (indicate pages)
_____ Primary workbook (indicate pages)
_____ Supplementary texts
_____ Teacher-made assignment/exercises
_____ Lab/manipulatives/equipment (not computers or calculators)
_____ Computers
_____ Calculators
_____ Other material
_____ Test: _____ teacher made (attach copy of test)
other (check type) :
_____ (a) district/state-developed
_____ (b) publisher-developed

7. Was homework assigned (check all that apply)?
_____ No
_____ Yes, reading assignment
_____ Yes, exercises to complete that have been corrected
_____ Yes, exercises to complete, but have not been corrected
_____ Yes, report/paper to write
_____ Yes, other _____

The $300 Billion Question: How Do Public Elementary and Secondary Schools Spend Their Money?

Lawrence O. Picus and Minaz B. Fazal
Center for Research in Education Finance
The Finance Center of the Consortium for Policy Research in Education
University of Southern California

About the Authors

Dr. Lawrence O. Picus is an associate professor in the School of Education at the University of Southern California and director of the Center for Research in Education Finance (CREF), which conducts studies of school finance and productivity as a response to the recent school reform movement.

Dr. Picus is a senior research fellow with the Finance Center of the Center for Policy Research in Education (CPRE). His teaching responsibilities include courses in school finance, school business administration, school district budgeting, economics of education, politics of education in the United States, and the application of microcomputers to school district management.

In his role with CREF and CPRE, Dr. Picus is involved with studies of how educational resources are allocated and used in schools across the country. He has also studied the impact of incentives on school district performance, maintaining close contact with national school district superintendents and officers.

Prior to his professorship at USC, Dr. Picus spent 4 years at The RAND Corporation, where he earned a Ph.D. in Public Policy Analysis. Before that, he was a principal investigator for the Northwest Regional Education Laboratory's Center for State Policy Studies, and for a number of school district-specific studies concerning management issues.

Minaz B. Fazal is a doctoral student in the Department of Educational Psychology and Technology at the University of Southern California, School of Education. She is also a statistics programmer for the university's Center for Research in Education Finance. She holds an M.S. degree in educational psychology and technology from the University of Southern California, an M.A. in clinical psychology from Bombay University, India, and a B.A. in psychology and philosophy from Jai Hind College in Bombay, India.

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Introduction

Spending on K-12 public education in the United States approaches $300 billion a year. These funds are used to employ 2.4 million teachers and some 400,000 additional instructional staff to educate more than 42 million children (National Education Association 1992). Despite this tremendous commitment to the education of our children, we know surprisingly little about how these funds are actually used or how new or additional funds are likely to be spent by the nearly 16,000 school districts and more than 80,000 schools across the Nation. While school districts are required to maintain detailed revenue and expenditure budgets for their operations, state-level fiscal reporting requirements vary dramatically, making comparisons difficult. Moreover, there are generally few state-level requirements governing the level of detail at which districts must keep school-level fiscal information. While a few states, most notably Florida (Picus and Nakib 1993), have begun requiring uniform school-level fiscal reporting, they are the exception instead of the rule. This means that very little information is available to policymakers interested in understanding how resource allocation patterns differ across schools, districts, states, and the Nation, and with what effects.

While a number of national data collection efforts are undertaken on a regular basis, Barro (1992) points out that incompatibilities across the major collection efforts result in a situation where "there is not a fully satisfactory way to answer even so seemingly straightforward a question as 'how much of total expenditure for elementary and secondary education in the United States goes to pay teachers' salaries?'" Odden and Picus (1992) argue that there is a great deal of information about how dollars are distributed to school districts, but insufficient data on how to put dollars to productive use in districts, schools, and classrooms. Moreover, there is little information on the equity of resource distribution to school districts across states.

To better understand these important issues, the Finance Center of the Consortium for Policy Research in Education has developed a strategy for improving the current state of knowledge on the distribution of revenues to school districts across the Nation, and to understand current resource allocation patterns in elementary and secondary schools. The Center is conducting the Integrated, Multi-level Resource Allocation study,

a multi-year, multi-faceted study of "what dollars buy" in education. Specifically, Center researchers analyze spending and resource allocation patterns at the national, state, district, and school levels.

This paper synthesizes a number of recently completed studies from this project. Each of the studies considered a different level of the K-12 public education system. Barro (1992) focused on comparisons at the national level and offered some initial findings on how education dollars are used by public elementary and secondary educational institutions by comparing state-level aggregate data. Picus used data from the Schools and Staffing Survey (SASS) of the National Center for Education Statistics (NCES) and the Census of Governments of the U.S. Bureau of the Census to analyze resource allocation patterns at the district (Picus 1993a) and school (Picus 1993b) levels. These two studies looked at how education dollars are allocated and spent in more than 4,000 school districts and nearly 6,400 schools across the United States. Finally, Picus and Bhimani (in press) analyzed more than 30,000 individual teacher responses to the SASS and compared teacher-reported class sizes with pupil/teacher ratios calculated from the state-, district-, and school-level analyses.

This paper begins with a discussion of the current state of knowledge regarding resource allocation patterns in schools. It follows with a summary of the study questions the earlier studies sought to answer and offers a brief description of the sources of data for our work. Following this discussion, the findings from the studies are described. Particular emphasis is given to discussion of per-pupil expenditures at the state and district levels and to the comparison of pupil/teacher ratios at the district and school levels with teacher reported class size.

Current Knowledge About Resource Allocation Patterns

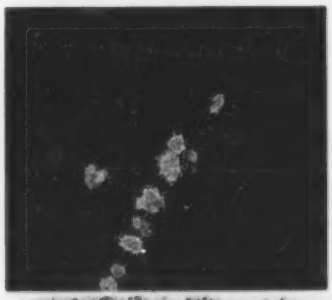
Over the years, only a few detailed studies of school district expenditure patterns have been conducted. Odden, Palaich, and Augenblick (1979) analyzed district spending patterns in New York for the 1977-78 school year. They found that spending for instruction represented about 60 percent of state and local operating expenditures per pupil, with high-spending districts devoting a slightly higher percentage of their resources to instruction than low-spending districts (63 percent for the highest-spending decile, compared with 58 percent in the lowest-spending decile). Odden, Palaich, and Augenblick also noted higher spending levels. They found that a slightly lower portion of instructional expenditures were devoted to teacher salaries in the high-spending than in the low-spending districts, making it possible for those districts to spend more on curriculum development, supervision, and pupil services.

A study by Hartman (1988) in Pennsylvania found similar spending patterns, with two exceptions. Instructional spending was approximately 60 percent of total expenditures, but the high-spending districts tended to spend a slightly lower percentage (58.1 percent) of their funds on instruction than did the low-spending districts (61.3 percent). Also, Pennsylvania districts seemed to spend more on reducing class size and less on increasing teacher salaries as the level of funding increased.

A related area of inquiry concerns estimates of what districts will do if they receive more money. This research has typically been done with cross-sectional databases, allowing researchers to identify how high-spending districts use additional resources compared with lower-spending districts. Two of these studies, Alexander (1974) and Barro and Carroll (1975),

analyzed data for districts with different spending levels in California and Michigan, respectively. Their purpose was to determine how higher spending districts within a state used the additional resources at their disposal. The findings from the two studies were remarkably similar: they found that per-pupil expenditures for teachers and administrators increased at a slower rate than did total current operating expenditures, and that expenditures for specialists and for supplies and equipment increased faster than total spending. Barro and Carroll found that as the total budget increased by 1 percent, teacher expenditure per pupil increased by only 0.75 percent, while Alexander's research concluded that only 41 percent of each additional dollar was spent on teachers.

Interestingly, both studies found that much of the increased expenditures on teachers were not used for increased salaries. Most of the new money (63 percent in Barro and Carroll's study and just over half in Alexander's) was used to hire more teachers, effectively reducing the pupil/teacher ratio. The studies also found that beginning teacher salaries were similar across spending levels.



Kirst (1977) analyzed how spending changed in five low-spending districts that received 15 percent funding increases as a result of the school finance reforms. Kirst found that most of the new funds were used to hire additional instructional personnel to reduce class size, add more class periods, or provide new specialists. In all five districts, salary increases were relatively small, and most of the funds were spent on hiring additional staff.

A recently completed study of eight school districts across the country by Cooper (1993) looked closely at district and school spending patterns by function. Within eight sample districts, Cooper found that between 79.6 and 94.1 percent of total per-pupil expenditures were made at school sites; that overall, between 57.9 and 62.8 percent of total expenditures were devoted to instruction; and that virtually all instructional expenditures were made at the school site. His research also found that expenditures for administration varied from 8.1 to 17.1 percent of total district expenditures and that in six of the eight districts, school site administrative costs represented the largest share of total administrative costs. There does not appear to be any relationship between the level of spending per pupil and the percent spent for either instruction or administration in Cooper's sample.

In a time series analysis of unified school districts in California between 1980-81 and 1985-86, Picus (1990) found that the proportion of total expenditures devoted to instruction increased in response to fiscal incentives designed to increase the length of the school day and school year. He also found evidence that as the incentive funds were integrated into district general revenues, there was a tendency for spending on instruction to revert to previous proportional levels.

As this brief review shows, there have been very few studies of how school districts spend money and allocate resources. What the few studies have shown is that allocations for instruction are remarkably consistent across districts and over time, averaging approximately 60 percent of total expenditures. Unfortunately, it is hard to draw any general conclusions about school district resource allocations given the few studies and small samples involved. Also, there has been little research on how factors such as average teacher salary, class size, and per-pupil expenditure affect these patterns.

Research Questions

As the above discussion shows, there has been relatively little research on how funds are allocated and used by school districts. The work summarized in this paper represents the first step in adding to that knowledge by analyzing spending patterns and resource allocation patterns for a nationally representative sample of school districts, schools, and teachers. The specific questions this research was designed to answer are:

1. How do current per-pupil expenditures for elementary and secondary education vary across school districts and states after adjusting for interstate cost differences?
2. How do pupil/teacher ratios vary among states, school districts, schools, and individual classrooms? How do variations in pupil/teacher ratios relate to district and student characteristics and community types?
3. How do teacher-reported class sizes differ from aggregate calculations of district and school pupil/teacher ratios, and how do those differences vary by district and school characteristics?

Description of the Database

The analyses described in this paper relied on data from a number of sources. Primary among them are two large-scale federal databases, the SASS for 1987-88 and the 1987 Census of Governments. The Census files contain expenditure data for the 1986-87 fiscal year, one year before the SASS data collection. Similar expenditure data for the universe of school districts are not available for 1987-88.

Although the merged database has a 1-year lag between the expenditure variables and the staffing variables, this analysis still provides valuable information to educational policymakers because school district spending habits and resource allocation patterns generally show relatively small incremental changes from year to year, as evidenced by the few studies that have been conducted in the past and are summarized above. Consequently, the relationships found between spending and staffing patterns are unlikely to vary dramatically from what would be expected if fiscal and staffing data were available for the same fiscal year.

By merging the expenditure data from the Census Bureau with the staffing and enrollment information from SASS, it is possible for the first time to analyze educational resource allocation and staffing patterns at the state, school district, school, and individual classroom levels. Detailed information on each of the databases is provided below.

The Schools and Staffing Survey

The 1987-88 SASS is an NCES comprehensive and nationally representative survey of 5,592 public school districts, 9,317 public schools in those districts, and more than 56,242 teachers at these same schools. Similar surveys of private schools were conducted. Since resource allocation patterns in the public school system is the focus of this paper, this discussion is limited to the public school component of the SASS.

The public school component of SASS consisted of four separate questionnaires. They are:

1. Teacher Demand and Shortage Questionnaire for public school districts, distributed to school district administrators;
2. Public School Questionnaire, distributed to school principals;
3. School Administrator Questionnaire, distributed to school principals; and
4. Public School Teachers Questionnaire, distributed to public school teachers.

Census of Governments

Data on school district expenditures were taken from the Census of Governments, 1987: Finances of Public School Systems, File D (U.S. Bureau of the Census, 1987), which provides data for the universe of 16,921 public elementary and secondary school districts and local higher education institutions. Available data include district expenditures and revenues, including breakdowns of the sources of revenue and current expenditures for instruction, support services, food services, and all others. Data on capital expenditures are also available. Data on current expenditures were the primary focus of the research reported here.

Merged Data Set

The first step in creating an analysis data set was to merge the data from the four SASS questionnaires. This was accomplished by comparing the control numbers on each response from each questionnaire form, and merging them into one data set, so that individual responses could be linked to schools and schools to their respective school districts. The second and more complicated process was to merge this data set with the Census data. With the help of NCES staff, we were able to combine our merged SASS file with File D of the Census of Governments. Our final sample contained data on 30,362 teachers in 6,388 schools and 4,370 districts. The fall-off in number of districts, and consequently of schools and teachers, results from two factors—nonresponse rates on the SASS questionnaires and inability to find matches for all of the SASS districts in the Census data. According to NCES, the response rates for the questionnaires were 89.4 percent for the district-level survey of teacher supply and demand; 91.9 percent for the public school questionnaire and 94.2 percent for the administrator questionnaire, both of which went to school principals; and 86.5 percent for the teacher survey. For a district to be included in our sample, responses from all four levels had to be available.

Answering the $300 Billion Question: Evidence from the Schools and Staffing Survey

This section offers a detailed discussion of the findings from the major studies of resource allocations completed to date. It initially focuses on expenditures, then summarizes our findings regarding pupil/teacher ratios and how they compare with teacher-reported classroom enrollments.

Expenditures Per Pupil

Although there is a general perception that funding for public education has declined in recent years, the data show that quite the opposite is true. Using data collected and published by NCES, table 1 shows the change in per-pupil expenditures by state from 1959-60 through 1989-90 for the Nation and for each of the 50 states and the District of Columbia. These figures are adjusted for both inflation and changes in student enrollments. What is clearly evident from this table is the dramatic increase in spending that occurred during those three decades. On average, real per-pupil spending for K-12 public schools increased by over 200 percent in that 30-year period.

This dramatic growth was not consistent across states. New Jersey and the District of Columbia experienced the highest rates of growth, with real expenditures increasing by more than 377 percent between 1959-60 and 1989-90. At the other extreme, Utah's real per-pupil expenditures increased by only about 96 percent during the same period. Interestingly, two of the states that adopted very highly centralized and state-controlled school finance systems in the 1970s had growth rates considerably lower than the national average. The 30-year growth in real per-pupil expenditures in Washington (157.62 percent) and California (139.68 percent) lends credence to Picus's theory that in states where there is a great deal of state control over the level of resources available to school districts, growth in per-pupil spending has lagged (Picus 1991).

Barro (1992) analyzed state educational expenditures for 1988-89. Using data from the NCES Common Core of Data and SASS and the expenditure, salary, and staffing data calculated by NEA, he found that there are some differences in estimates of how much money is available at the state level and in how educational resources are used. Barro shows that in 1988-89, per-pupil expenditures for current operations varied from a high of $6,888 in the District of Columbia to a low of $2,413 in Utah, a ratio of 2.9:1. When

Table 1.

Change in real expenditure per pupil in average daily attendance in public elementary and secondary schools, by state: United States, 1959-60 to 1989-90 (constant 1989-90 dollars)

State	Current expenditure 1959-60 ($)	Current expenditure 1969-70 ($)	Percent change 1959-60 to 1969-70 (%)	Current expenditure 1979-80 ($)	Percent change 1969-70 to 1979-80 (%)	Current expenditure 1989-90 ($)	Percent change 1979-80 to 1989-90 (%)	Percent change 1959-60 to 1989-90 (%)
United States	1,621	2,743	69.22	3,345	21.95	4,960	48.28	205.98
Alabama	1,042	1,828	75.43	2,281	24.78	3,327	45.86	219.29
Alaska	2,361	3,773	59.81	5,978	58.44	8,374	40.08	254.68
Arizona	1,744	2,421	38.82	2,980	23.09	4,057	36.14	132.63
Arkansas	973	1,908	96.09	2,190	14.78	3,485	59.13	258.17
California	1,832	2,915	59.12	3,351	14.96	4,391	31.04	139.68
Colorado	1,712	2,480	44.86	3,154	27.18	4,720	49.65	175.70
Connecticut	1,884	3,197	69.69	3,816	19.36	7,604	99.27	303.61
Delaware	1,969	3,025	53.63	3,711	22.68	5,696	53.49	189.28
Dist. of Columbia	1,863	3,423	83.74	4,361	27.40	8,904	104.17	377.94
Florida	1,373	2,461	79.24	3,198	29.95	4,997	56.25	263.95
Georgia	1,095	1,976	80.46	2,586	30.87	4,187	61.91	282.37
Hawaii	1,403	2,825	101.35	3,378	19.58	4,448	31.68	217.03
Idaho	1,252	2,028	61.98	2,491	22.83	3,078	23.56	145.85
Illinois	1,895	3,057	61.32	3,717	21.59	5,118	37.69	170.08
Indiana	1,593	2,447	53.61	2,731	11.61	4,549	66.57	185.56
Iowa	1,589	2,837	78.54	3,086	8.78	4,453	44.30	180.24
Kansas	1,503	2,592	72.46	3,114	20.14	4,752	52.60	216.17
Kentucky	1,007	1,833	82.03	2,218	21.00	3,675	65.69	264.95
Louisiana	1,607	2,178	35.53	2,771	27.23	3,855	39.12	139.89
Maine	1,222	2,328	90.51	2,717	16.71	5,373	97.75	339.69
Maryland	1,697	3,087	81.91	3,838	24.33	6,196	61.44	265.11
Massachusetts	1,767	2,888	63.44	3,630	25.69	6,237	71.82	252.97
Michigan	1,794	3,038	69.34	3,737	23.01	5,546	48.41	209.14
Minnesota	1,837	3,037	65.32	3,785	24.63	4,971	31.33	170.60
Mississippi	890	1,684	89.21	2,149	27.61	3,096	44.07	247.87
Missouri	1,486	2,382	60.30	2,816	18.22	4,507	60.05	203.30
Montana	1,775	2,628	48.06	3,313	26.07	4,736	42.95	166.82
Nebraska	1,456	2,475	69.99	3,115	25.86	4,842	55.44	232.55
Nevada	1,860	2,586	39.03	2,913	12.65	4,117	41.33	121.34
New Hampshire	1,501	2,430	61.89	2,893	19.05	5,304	83.34	253.36
New Jersey	1,675	3,416	103.94	4,371	27.96	7,991	82.82	377.07
New Mexico	1,567	2,376	51.63	2,731	14.94	3,518	28.82	124.51
New York	2,427	4,460	83.77	5,659	26.88	8,062	42.46	232.18
North Carolina	1,025	2,058	100.78	2,677	30.08	4,268	59.43	316.39
North Dakota	1,585	2,318	46.25	2,724	17.52	4,189	53.78	164.29
Ohio	1,577	2,454	55.61	2,862	16.63	5,136	79.45	225.68
Oklahoma	1,346	2,032	50.97	2,517	23.87	3,512	39.53	160.92
Oregon	1,937	3,108	60.45	3,826	23.10	5,521	44.30	185.03
Pennsylvania	1,769	2,964	67.55	3,712	25.24	6,061	63.28	242.62
Rhode Island	1,786	2,996	67.75	3,933	31.28	6,249	58.89	249.89
South Carolina	951	2,059	116.51	2,531	22.92	4,088	61.52	329.86
South Dakota	1,499	2,319	54.70	2,626	13.24	3,732	42.12	148.97
Tennessee	1,029	1,903	84.94	2,429	27.64	3,664	50.84	256.07
Texas	1,436	2,098	46.10	2,607	24.26	4,150	59.19	189.00
Utah	1,393	2,105	51.11	2,510	19.24	2,730	8.76	95.98
Vermont	1,486	2,713	82.57	3,348	23.41	6,227	85.99	319.04
Virginia	1,185	2,379	100.76	2,941	23.62	4,612	56.82	289.20
Washington	1,817	3,077	69.35	3,419	11.11	4,681	36.91	157.62
West Virginia	1,117	2,252	101.61	2,567	13.99	4,359	69.81	290.24
Wisconsin	1,785	2,967	66.22	3,454	16.41	5,524	59.93	209.47
Wyoming	1,946	2,877	47.84	3,496	21.52	5,577	59.53	186.59

Source: National Center for Education Statistics, *Digest of Education Statistics*, 1992.

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these figures are adjusted for price differentials across states, the ratio decreases to 2.3:1, with cost-adjusted expenditures in the District of Columbia of $6,064 (still the highest) and $2,638 in Utah (still the lowest).[1]

In analyzing expenditures at the district level, Picus (1993a) found that there is substantially less equity in per-pupil educational expenditures across school districts than is apparent when analyzing state-level fiscal databases. Table 2 shows that district per-pupil expenditures for education ranged from less than $1,000 to more than $50,000 in 1987-88, the most recent year for which SASS data are available (Picus 1993a). The coefficient of variation for per-pupil expenditures was 0.525. When adjusted for differences in the cost of education across states, the coefficient of variation declined to 0.475. Even this cost-adjusted figure is considerably larger than the coefficient of variation found in any individual state. This implies that a considerable school funding equity problem continues across our Nation.

We also found that most districts spent approximately 60 percent of their resources on direct instruction (as defined by the Census Bureau). Moreover, there was considerably less variation in the share of expenditures devoted to instruction than in total per-pupil spending. The coefficient of variation was only 0.105, indicating very little variation in the share of total resources devoted to instruction. Not only is this an important finding, its consistency is surprising. It means that as districts get more funds, they continue to spend each additional dollar in roughly the same proportion as the dollars they received previously. The strength of this finding is remarkable. Using a methodology that analyzes school district spending from the bottom up by aggregating school level expenditures, Cooper (1993) also found that instruction consistently accounts for 60 percent of district spending.

This finding does not mean, however, that all children are treated equally. As the data presented above indicate, there are dramatic disparities in per-pupil expenditures across school districts. This means that a district spending

[1]It is important to take interstate variations in the cost of education into account in analyzing revenue and expenditure data. Unfortunately, little work has been done to estimate these variations. In this section, all data have been cost adjusted using either Barro's cost of education index (see Barro 1992) or an index prepared by the American Federation of Teachers based on differences in personnel salaries (Nelson 1991).

Table 2.
Statistical summary of per-pupil expenditure for current operations, per-pupil expenditure for instruction, and percent of total expenditures devoted to instruction, actual and cost adjusted for interstate cost-of-education differences: United States, 1986-87

Statistic	Actual		Cost-adjusted		
	Dollar expenditure for current operations	Dollar expenditure for instruction	Dollar expenditure for current operations	Dollar expenditure for instruction	Instruction expenditure as a percent of total
Mean	3,659	2,137	3,698	2,164	59.16
Standard deviation	1,912	961	1,759	825	6.28
Maximum	57,170	19,677	68,880	16,963	95.70
Minimum	861	520	742	452	18.12
Range	56,309	19,157	68,137	16,511	77.58
Median	2,795	1,933	3,407	2,007	58.97
Interquartile range	1,232	734	1,152	682	7.26
Range (99-1)	7,921	4,453	6,742	3,630	31.72
Range (95-5)	3,855	2,188	3,329	1,884	21.41
Range (90-10)	2,787	1,595	2,351	1,370	15.06
Coefficient of variation	0.524	0.450	0.476	0.381	0.106

Source: Calculated from the NCES Schools and Staffing Survey, 1987-88, and U.S. Bureau of the Census, Census of the Governments, 1987, Finances of Public School System's—File D.

$10,000 per pupil still has twice as much money to spend on instruction as does a district spending $5,000 per pupil. Not surprisingly, we found that as a district's expenditures increase, average class size declines and average teacher number increases somewhat. Moreover, one would expect that additional services for children are more readily available in high-spending districts than in low-spending districts.

These findings imply that efforts to force districts to direct new funds to preferred programs, such as instruction, may face considerable difficulty. Picus's study of the use of incentive funds in California in the first half of the 1980s lends further evidence to the finding that districts continue spending in the same proportions, regardless of the amount of money available (Picus 1990).

Our district-level analysis also found that spending tends to be higher in larger metropolitan areas. Table 3 shows that as the size of a central city increases, so does per-pupil spending. Moreover, suburban districts surrounding large and very large cities tend to spend more than the central cities they surround. The opposite is true in medium-size cities, but for small and medium cities, overall spending levels are below those for large and very large cities and their suburbs.

Finally, rural areas have the second lowest per-pupil spending level, exceeding only the average spending of school districts in small cities. Again, the proportion of expenditures devoted to instruction is remarkably consistent across community types, as shown in the last column of table 3.

Table 4 shows how per-pupil spending varies by district enrollment. This table shows that spending is highest in the smallest districts. There is a general pattern of declining expenditures until enrollments reach approximately 25,000, when per-pupil expenditures begin to increase again. More important than how much is spent in each district is how those funds are spent. As indicated above, 60 percent of each dollar on average goes to instruction, which is essentially teacher salaries and student supplies. The next section describes our findings regarding pupil/teacher ratios, while the section that precedes it presents information regarding average teacher salaries.

Pupil/Teacher Ratios and Average Class Size

One of the highest policy priorities of the education community has been the reduction of

Table 3.
Variation in actual and cost-adjusted per-pupil expenditure by type of community: United States, 1986-87

Type of community	Actual		Cost-adjusted		
	Total dollar expenditure	Dollar expenditure for instruction	Total dollar expenditure	Dollar expenditure for instruction	Percent of expenditure for instruction
Rural/farming	3,552	2,044	3,705	2,135	58.70
Small city	3,486	2,085	3,509	2,105	60.14
Medium city	3,804	2,243	3,682	2,181	59.40
Medium suburb	3,641	2,161	3,567	2,122	59.63
Large city	3,865	2,241	3,739	2,175	58.18
Large city suburb	4,040	2,380	3,935	2,316	59.15
Very large city	3,944	2,287	3,786	2,193	58.21
Very large city suburb	4,698	2,700	4,419	2,541	57.60
Military base	3,596	2,125	3,632	2,146	59.72
Indian reservation	6,483	3,277	6,530	3,295	52.98

Source: Calculated from the NCES Schools and Staffing Survey, 1987-88, and U.S. Bureau of the Census, Census of the Governments, 1987, Finances of Public School System's—File D.

Table 4.
Average expenditure per pupil by school district enrollment: United States, 1986-87

District enrollment	Average expenditure per pupil ($)
1-499	4,417
500-999	3,778
1,000-2,499	3,401
2,500-4,999	3,506
5,000-9,999	3,482
10,000-24,999	3,360
25,000-49,999	3,558
More than 50,000	3,728

Source: Calculated from the NCES Schools and Staffing Survey, 1987-88, and U.S. Bureau of the Census, Census of Governments, 1987, Finances of Public School System s—File D.

class size to improve student achievement. Even though the research evidence to support a positive effect of class-size reductions on student outcomes suggests certain limitations on the impact of class size reductions on performance, there is almost universal agreement that reduction of class size is important if learning is to improve in our Nation's schools (see Odden 1990; Slavin 1989; Smith and Glass 1980). What the research seems to indicate is that substantial reductions in class size are needed to improve student performance. The work of Slavin (1989), Smith & Glass (1980), and Odden (1990) suggests that to be truly effective, a class size of not more than about 15 pupils per teacher is needed.

A cursory review of the 1992 *Digest of Education Statistics* (National Center for Education Statistics 1992) shows that the average pupil/teacher ratio for K-12 public schools in the United States was only 17.2:1 in 1991, close to the 15 students per teacher emphasized in most research. Moreover, the data provided in the *Digest* suggest that this ratio has declined consistently since 1955, when it stood at 26.9 pupils per teacher (National Center for Education Statistics 1992). In fact, except for an increase of 0.1 between 1961 and 1962, the average pupil/teacher ratio across the United States has declined in every year since 1955.

There is considerable variation in pupil/teacher ratios by state. In fact, the *Digest* shows that in the fall of 1990, the pupil/teacher ratio ranged from a low of 13.2 pupils per teacher in Vermont to a high of 25 in Utah (National Center for Education Statistics 1992). In addition to Vermont, four states/districts have a pupil/teacher ratio lower than 14. They are Connecticut, the District of Columbia, Maine, and New Jersey. Conversely, only three states have a pupil/teacher ratio that exceeds 20. They are Utah, California, and Washington.

The typical policymaker views the pupil/teacher ratio as a proxy for class size. Despite what would therefore appear to be small class sizes, teachers across the Nation complain that their classes are much too large. They argue that if they are to succeed in making dramatic improvements in student achievement, class size must be reduced. They often complain of classes with 30 or more students and of the impossibility of meeting the needs of individual students under such conditions. The explanation for this difference between what teachers say and what the national averages seem to indicate is that the national averages include special education classes, which generally have many fewer students, and that there are a number of itinerant teachers in many districts who provide special pull-out services for children through a variety of programs, including Chapter 1, gifted and talented education, and art and music instruction. Also, these national averages often include certified personnel who have nonteaching assignments, such as counselors and curriculum development specialists.

It is important to fully understand why these differences exist. Data from the SASS provide the first opportunity to systematically consider the differences between self-reported class size and other district characteristics, such as expenditure level or demographic characteristics.

Variation in Pupil/Teacher Ratios by School and District Characteristics

Our study sample comprised 30,362 teachers who responded to the SASS teacher questionnaire. Eliminated from the total sample of more than 56,000 teachers were those who indicated

that they taught less than full time and those for whom a school and district match could not be made. Because it is impossible to ascertain how this reduction in the sample affects the representatives of the sample, we have elected to use the data as one large national sample rather than attempt to conduct analyses at the state level. The difficulties of assuming a representative sample on a state-by-state basis would be considerable, given this fall-off in the sample.

Our sample of 30,362 was further divided into two subsamples. One subsample was established for the 12,177 teachers who indicated that they taught in a self-contained setting, while the second subsample comprised the 18,185 teachers who indicated that they were in schools that used departmentalized instruction. The self-contained setting is like that found in most elementary schools across the country, while the departmentalized setting is most often found in secondary schools. At the middle or junior high school level, both models can be observed, but generally teachers reported using departmentalized instruction in the sixth, seventh, and eighth grades.

District and School Pupil/Teacher Ratios versus Individually Reported Class Size Estimates

Perhaps the most important finding from our analysis of the SASS teacher questionnaire data is the confirmation of teachers' argument that they have much larger classes than most national- and state-specific pupil/teacher ratio data indicate. Table 5 provides a summary of our district-, school-, and teacher-level findings as to the pupil/teacher ratios or teacher-reported class sizes for various levels and types of schools. Table 5 shows the difference between aggregate data from the district and school levels and self-reported teacher data. At the district and school levels, the pupil/teacher ratio for elementary grades (K-6) is between 17.68 and 18.77 pupils per teacher. However, the mean teacher-reported class size for self-contained classrooms is 24.21, some 29 to 36 percent larger than estimates based on district and school data.

Similarly, the average secondary school pupil/teacher ratio as reported on the district level SASS questionnaires was 14.41:1. At the school level,

Table 5.
Statistical summary of pupil/teacher ratio data at the school district, school, and teacher reporting levels: United States, 1987-88

Statistic	District			School			Teacher	
	Pupils per teacher, grades K–12	Pupil per teacher, grades K-6	Pupils per teacher, grades 7-12	Pupils per teacher, elementary	Pupils per teacher, intermediate	Pupils per teacher, secondary	Self-contained classroom	Departmentalized classroom
Mean	16.59	18.54	15.47	18.66	16.31	16.79	24.05	22.68
Standard deviation	3.92	7.92	6.23	4.50	3.83	5.13	13.12	11.07
Maximum	40.50	40.50	40.50	47.50	34.38	60.36	120.00	120.00
Minimum	2.00	2.00	2.00	1.55	1.92	2.40	0.50	0.37
Range	38.50	38.50	38.50	45.95	32.46	57.96	119.5	119.63
Median	16.40	17.85	14.97	18.45	16.16	16.49	23.00	22.00
Inter-quartile range	4.66	5.18	5.68	5.63	5.03	5.50	8.00	9.20
Range (99-1)	19.50	21.98	24.76	21.85	19.35	28.01	95.00	68.20
Range (95-5)	13.00	14.50	15.69	14.54	12.13	15.50	27.00	27.17
Range (90-10)	9.49	11.03	11.51	10.93	9.23	11.54	19.00	18.92
Coefficient of variation	0.236	0.367	0.398	0.24	0.23	0.30	0.54	0.49
Number of observations	4,370	4,225	4,257	3,378	1,179	1,831	12,176	18,185

Source: Calculated from the NCES Schools and Staffing Survey, 1987-88

the mean pupil/teacher ratio was 16.38 for intermediate schools and 16.55 for secondary schools. On the other hand, the teacher-reported average class size for departmentalized classes was 22.65. The difference between teacher-reported class size and the pupil/teacher ratios computed through district and school averages, while disconcerting, was not unexpected, given that teachers have been making similar claims for a number of years. Because our earlier analyses found a number of significant factors that affect the pupil/teacher ratio, it seemed fruitful to determine whether those same factors have any impact on self-reported class size. To conduct this analysis, we shifted our focus moderately. Rather than describe the differences in pupil/teacher ratios and teacher-reported class size, we converted these data into estimates of the number of teachers per 1,000 students.[2] The advantage of doing so is that it is possible to get a measure of how many teachers there are, on average, with assignments outside of the regular classroom.

For example, the district-level pupil/teacher ratio for grades K-6 shown in table 5 is 17.68. This is the equivalent of 56.56 teachers per 1,000 students. Similarly, the teacher-reported class size for self-contained classrooms was 24.05 pupils per teacher. This translates to 41.58 teachers per 1,000 students, implying that nearly 15 teachers per 1,000 students at the elementary level have assignments outside of the regular classroom. This would include special education teachers, who typically have smaller classes, itinerant teachers, and teachers of special subjects, such as music and art. The SASS collected enough data to allow us to distinguish between individuals with teaching assignments and those who have nonteaching assignments, such as counseling or curriculum development, and that the 15 teachers per 1,000 students at the elementary level are all assigned to some form of instruction, although without full-time regular education class responsibilities. Below, we describe how the number of teachers without regular classroom assignments varies by district and school characteristics. Except as noted, all of the differences reported below are statistically significant at the 0.01 level.

[2]This is calculated by inverting the pupil/teacher ratio and multiplying by 1,000.

Variation by Enrollment

Our earlier analysis at the district level showed that the pupil/teacher ratio increased with district size. Our modeling indicated that these effects were relatively small, amounting to approximately 0.2 pupils per class when a district's enrollment increased by 1,000 students (Picus 1993a). While this seems to be a very small effect, it is statistically significant.

Our analysis at the school level showed a similar pattern, with the average pupil/teacher ratio increasing as the enrollment in a school increased. Our modeling showed a much stronger effect, with an increased school enrollment of 100 students leading to an estimated increase in class size of approximately 'one-half' of a student.

Table 6.
Average number of teachers per 1,000 students with assignments outside of the regular classroom by school district and school enrollment: United States 1987-88

Enrollment	Average number of teachers[1]	
	Self-contained classroom	Departmentalized classroom
District		
1-500	5.61	24.55
500-999	6.91	16.60
1,000-2,499	7.33	13.87
2,500-4,999	7.19	12.75
5,000-9,999	6.31	11.10
10,000-24,999	2.35	9.17
25,000-49,999	1.34	10.57
50,000 or more	1.79	8.36
School		
1-99	1.82	43.38
100-199	12.98	20.30
200-299	9.09	15.16
300-399	9.14	14.89
400-499	7.07	12.81
500-599	6.86	12.29
600-799	6.32	11.01
800-999	6.74	8.77
1,000-1,499	7.87	8.46
1,500-1,999	10.57	6.08
2,000-2,499	1.02	7.07
2,500-2,999	—	6.76
3,000 or more	—	10.07

[1]Values were calculated using the following formula: ((teacher/pupil ratio) - (self-reported teacher/pupil ratio)) x 1,000.

Source: Calculated from the NCES Schools and Staffing Survey, 1987-88

Table 6 shows how the average number of teachers per 1,000 students who have assignments outside the regular classroom varies by district and school enrollment. The table shows that as the enrollment of a district or school increases, there tend to be fewer of these teaching positions per 1,000 pupils. In fact, when district enrollment exceeds 25,000, the difference is no longer statistically significant for the self-contained classes. This finding would seem to indicate that there are economies of scale to be found in the delivery of the services provided by these teachers, given the lower number of teachers per 1,000 students with such assignments in districts and/or schools with higher enrollments. The lack of statistical significance at very high enrollments suggests that very few of these individuals are employed by the district per 1,000 students.

Some of the numbers in table 6 should be viewed with caution. For example, the first line of data imply that there are more than 24 non-classroom teaching positions on average in school districts with fewer than 500 students. Since the district size is considerably fewer than 1,000, this means that on average, a district with 500 students would have approximately 12 such individuals on staff, still a rather large number.

Table 7.
Average number of teachers per 1,000 students with assignments outside of the regular classroom by school district expenditure per pupil: United States, 1987-88

Dollar expenditure	Average number of teachers[1]	
	Self-contained classroom	Departmentalized classroom
less than 1,500	3.36	12.04
1,500-1,999	5.66	2.99
2,000-2,499	4.55	7.85
2,500-2,999	2.94	10.20
3,000-3,499	2.98	9.65
3,500-3,999	4.95	13.76
4,000-4,499	7.42	13.57
4,500-4,999	10.09	21.54
5,000-5,499	11.87	20.90
5,500-5,999	5.10	27.79
6,000 or more	23.08	10.79

[1]Values were calculated using the following formula:
[(teacher/pupil ratio) - (self-reported teacher/pupil ratio)] x 1,000

Source: Calculated from the NCES Schools and Staffing Survey, 1987-88

Table 8.
Average number of teachers per 1,000 students with assignments outside of the regular classroom by school district expenditure per pupil for instruction: United States, 1987-88

Dollar expenditure	Average number of teachers[1]	
	Self-contained classroom	Departmentalized classroom
less than 1,500	4.59	7.14
1,500-$1,999	2.99	9.86
2,000-$2,499	5.28	12.86
2,500-$2,999	8.19	18.03
3,000-$3,499	10.29	27.52
3,500-$3,999	6.08	25.03
4,000-$4,499	14.66	42.91
4,500-$4,999	7.11	24.62
5,000-$5,499	-12.24	-0.22
5,500-$5,999	40.09	4.75
6,000 or more	23.63	20.32

[1]Values were calculated using the following formula:
[(teacher/pupil ratio) - (self-reported teacher/pupil ratio)] x 1,000

Source: Calculated from the NCES Schools and Staffing Survey, 1987-88

Variation by District Expenditure Per Pupil

Picus (1993a) found that district-level pupil/teacher ratios declined as expenditures per pupil and expenditures per pupil for instruction increased. However, as the percent of expenditures devoted to instruction increased, a similar pattern did not emerge. Since expenditure data are not available at the school-level, Picus (1993b) compared school level pupil/teacher ratios with district per-pupil expenditures. He found that at the elementary, intermediate, and secondary school levels, there is a trend toward smaller classes as expenditures increase.

Variations in the number of nonregular classroom teaching positions per 1,000 students by district expenditure per pupil, per-pupil expenditure for instruction, and percent of total expenditures devoted to instruction are shown in tables 7, 8, and 9, respectively. Table 7 shows how the number of teachers outside the regular classroom

Table 9.
Average number of teachers per 1,000 students with assignments outside of the regular classroom by percent of total expenditures for instruction: United States, 1998-88

Percent	Average number of teachers[1]	
	Self-contained classroom	Departmentalized classroom
Less than 50	5.42	9.83
50-54.99	4.97	11.31
55-59.99	4.45	11.68
60-64.99	4.76	14.53
65-69.99	7.53	14.43
70-74.99	5.51	13.36
75-79.99	4.66	11.77
80 or more	-23.48	18.93

[1]Values were calculated using the following formula:
[(teacher/pupil ratio) - (self-reported teacher/pupil ratio)] x 1,000

Source: Calculated from the NCES Schools and Staffing Survey, 1987-88

varies with per-pupil expenditure. Overall, there seems to be an increase in the number of such teachers per 1,000 students as expenditures increase. When considered with the earlier finding of Picus (1993a, 1993b) that the share of total expenditures devoted to instruction is fairly constant regardless of spending level, table 7 suggests that districts with more money reduce class size and employ more individuals with assignments outside of the regular classroom. The differences reported for districts with expenditures below $2,000 per pupil were not statistically significant.

This pattern is not as clear when per-pupil expenditures for instruction are considered (table 8). As expenditures for instruction increase, the number of teachers per 1,000 students with assignments outside the classroom varies considerably. There is a slight tendency for the number of such positions to increase as expenditures per pupil increase in the low to middle portions of the expenditure range, but the pattern is less consistent at the higher spending levels. For the 30 districts represented as having expenditures between $4,500 and $5,000 per pupil, the differences reported in table 8 are not statistically significant. Departmentalized class differences are also not statistically significant for districts with expenditures between $5,000 and $6,000 per pupil.

Table 9 reports the average number of teachers outside of the regular classroom by percent of total expenditures devoted to instruction. The variation in both the self-contained and departmentalized schools is relatively small. When combined with the fact that the vast majority of the districts are clustered in the center of the range presented in table 9, it is difficult to draw any substantial conclusions about the impact of the share of expenditures devoted to instruction on the way teachers are assigned in schools. What these findings seem to indicate is that in high-spending districts, there are both smaller classes and more support positions than can be found in low-spending districts. These findings are statistically significant at the 0.01 level for self-contained classes in districts where expenditures for instruction are below 70 percent of total expenditures and for departmentalized classes where instruction expenditures are below 75 percent.

These findings indicate that the amount of money available to a school district does matter in terms of the class size it is able to provide for its students. To the extent that smaller classes improve student opportunities for learning, higher expenditures increase the probability that a student will attend class with fewer classmates and that teachers will have smaller classes.

Variation by District and School Teacher/Pupil Ratios

Tables 10 and 11 compare the number of teachers per 1,000 students who do not have regular classroom assignments with the teacher/pupil ratios computed in our earlier research (Picus 1993a, 1993b). Table 10 shows how the average number of such teachers varies with the number of teachers per 1,000 students at the district reporting level, while table 11 displays the same comparison at the school reporting level. Both tables show a very strong pattern of fewer teachers with assignments outside of the regular classroom as the number of teachers per 1,000 students declines. This implies that as the average district or school pupil/teacher ratio increases (the teacher/pupil ratio decreases), there are fewer

Table 10.
Average number of teachers per 1,000 students with assignments outside of the regular classroom by district-level teacher/ pupil ratios: United States, 1987-88

Number of teachers per 1,000 pupils	Average number of teachers[1] per 1,000	
	Self-contained classroom	Departmentalized classroom
More than 100	72.71	49.21
90.01-100.00	28.26	29.52
80.01-90.00	17.46	22.24
70.01-80.00	16.84	16.38
60.01-70.00	10.08	10.78
50.01-60.00	4.97	7.02
40.00-50.00	-2.63	0.15
30.01-40.00	-7.35	-5.52
20.01-30.00	-23.64	-31.91
Fewer than 20.00	-42.30	-44.84

[1]Value were calculated using the following formula:
|(teacher/pupil ratio) - (self-reported teacher/pupil ratio)| x 1,000

Source: Calculated from the NCES Schools and Staffing Survey, 1987-88

other certified personnel to provide additional opportunities for students.

The negative numbers at the lowest teacher/ pupil ratios in both tables 10 and 11 are somewhat disconcerting as they imply that the district or school estimate of the number of teachers per 1,000 students is lower than the teacher-reported number of teachers per 1,000 students. This appears to indicate a relatively small number of schools and/or districts in the sample at these very low values of teachers per 1,000 students, resulting in a heavy influence of a small number of very large classes, most likely band and physical education.

These findings makes sense when one considers the expenditure findings from the district-level analysis. Remember that districts spend an average of 60 percent of their resources on direct instruction. Given that higher-spending districts have smaller classes but still spend 60 percent of their funds on instruction, the remaining 40 percent also represents a larger per-pupil figure than is reported in low-spending districts. Thus, it is not surprising that districts with more to spend tend to have higher numbers of other certified staff available in their schools. Apropos this finding, the next section compares teacher-reported class size with the relative number of certified but nonteaching staff in each school.

Variation by Other Variables

In our earlier work, we analyzed pupil/ teacher ratios in comparison with a number of other district and school characteristics. These included the percent of minority pupils in the school or district, the number of pupils qualifying for a free or reduced-price lunch (as a proxy for poverty), and the type of community in which the district and/or school is located. Similar analyses were undertaken for this project. However, analyses of the average teacher-reported class size by each of the variables identified above showed no identifiable patterns. This was true for both the departmentalized classroom and the self-contained teacher-reported samples.

Conclusion

In our earlier work, we attempted to develop analytic models to predict the pupil/teacher ratio. These models provided additional insight into the factors that are related to pupil/teacher ratios at

Table 11.
Average number of teachers per 1,000 students with assignments outside of the regular classroom by school-level teacher/ pupil ratios: United States, 1987-88

Number of teachers per 1,000 pupils	Average number of teachers[1] per 1,000	
	Self-contained classroom	Departmentalized classroom
More than 100	55.28	49.21
90.01-100.00	31.54	29.52
80.01-90.00	23.10	22.24
70.01-80.00	18.28	16.38
60.01-70.00	12.58	10.78
50.01-60.00	7.10	7.02
40.00-50.00	1.84	0.15
30.01-40.00	-3.28	-5.52
20.01-30.00	-16.06	-31.91
Fewer than 20.00	—	-44.84

[1]Value were calculated using the following formula:
|(teacher/pupil ratio) - (self-reported teacher/pupil ratio)| x 1,000

Source: Calculated from the NCES Schools and Staffing Survey, 1987-88

attempted to develop analytic models of the teacher-reported class size as well. Because we had data on individual teachers, individual schools, and school districts, we attempted to model teacher-reported class size using three equations for teachers in both self-contained and departmentalized classrooms. Each equation used either the self-contained or departmentalized class size as the dependent variable and a series of independent variables describing either individual, school, or district characteristics. While the analysis resulted in a number of significant coefficients, we were never able to explain more than 6 percent of the variance in the teacher-reported class size, regardless of functional form.

There are considerable difficulties with including variables from different levels in one regression equation. A frequent solution to this problem is to use hierarchical linear modeling (HLM) techniques to control for different levels in the equations. On the surface, the SASS data appear to be ideally suited for such treatment. However, the SASS design has only four to eight teachers in each school and between one and three schools in each district. To get significant results from an HLM model, the nested data sets require a minimum of approximately 30 observations, making HLM inappropriate for this analysis.

As a result, we are unable to explain most of the variation in teacher-reported class size in K-12 public schools. Although disappointing, these results may lend credence to our earlier suspicion that schools are basically consistent in what they do. The clearest example of this is the share of expenditures devoted to instruction, which averages 60 percent regardless of how much money is available to a school district. Since our initial analyses indicate that class size declines as expenditures increase and that the difference between school pupil/teacher ratios and teacher-reported class size declines as those ratios increase, it may be that school administrators are inclined to spend whatever resources are available to them, according to the same "rules of thumb," regardless of the level of those resources. This means that districts with substantially more money will be able to offer considerably more of everything to their students. The increased number of dollars available for instruction will translate into smaller class size and higher-paid teachers, but at the same time, additional resources will be spent on nonclassroom certified staff to provide a range of support to teachers as well.

This leads to an interesting question: do expenditures in other functional areas, such as administration and instructional support, remain proportionally the same as school district expenditures increase, or do those proportions change in spending levels? Unfortunately, the expenditure data provided by the 1986-87 Census of Governments do not allow fine enough distinctions across expenditure functions to conduct such an analysis. The 1990-91 Census of Governments, along with the 1990-91 SASS and the Census project to link Census and school district data more closely, will hopefully enable us to conduct such analyses in the future.

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Education Finance Indicators: What Can We Learn From Comparing States with Nations?

Thomas M. Smith
National Center for Education Statistics, U.S. Department of Education

Richard P. Phelps
Pelavin Associates, Inc.

About the Authors

Thomas M. Smith is a statistician at the National Center for Education Statistics, U.S. Department of Education. He currently serves as editor and primary author of one of the Center's flagship publications, *The Condition of Education*. Since earning an M.A. in economics at Columbia University in 1991, he has conducted research on the labor market outcomes of education and the expansion of higher education into a mass system. He is currently working on a doctorate in sociology at the Catholic University of America in Washington, D.C.

Mr. Phelps has directed and conducted education research studies for nearly a decade. He has recently been working on several tasks associated with the National Center for Education Statistics' International Analysis project, including the first two editions of *Education in States and Nations* and a cross-national education expenditure statistics comparability study. In addition, he has written reports pertaining to the Chapter 1 program, the school-to-work transition, the High School and Beyond longitudinal study, and the Equity 2000 program.

In a previous position with the U.S. General Accounting Office, he managed a project that determined the extent and cost of standardized testing in the United States and estimated the cost of a national examination system. Prior to that work, Mr. Phelps was the Research and Evaluation Coordinator for Indiana's Education Department, where he managed quantitative research, sampling and survey design, and statistical analyses. There, he designed and managed the production of the first in an annual series of indicator reports, *Trends in Indiana Education*.

Mr. Phelps has also taught high school math and science for two years in the French curriculum in Burkina Faso, West Africa. He received his graduate training in public policy and finance at the Kennedy School of Government at Harvard and at the Wharton School of the University of Pennsylvania.

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Thomas M. Smith
National Center for Education Statistics, U.S. Department of Education

Richard P. Phelps
Pelavin Associates, Inc.

Using indicators to study education issues requires making comparisons. Most of the comparisons in indicator reports, such as the *Condition of Education*, use time-series data, which provide a perspective on whether things are getting better, getting worse, or staying about the same. Other indicators rely on cross-sectional comparisons. For example, indicators are sometimes observed from a single time period across states or regions or across different population subgroups, which provide a perspective on whether things are better, worse, or about the same under different conditions, policies, or practices.

Of particular current popularity and relevance are cross-sectional education indicators that allow international comparisons. What students in other countries achieve has become a benchmark against which the achievement of U.S. students is now measured. Comparing students' achievement with their countries' financial support for education, in turn, provides an indication of the cost-effectiveness of countries' education systems. This type of comparison is particularly compelling because the U.S. economy is increasingly a part of the global economy and the standard of living in the United States is increasingly dependent on the ability of U.S. workers and industry to be more productive than workers and industries abroad.

As a statistical agency, our role at the National Center for Education Statistics (NCES) is to help bring data to bear on these issues, which we can do by coordinating with our international counterparts. The Organization for Economic Cooperation and Development (OECD), a 24-member grouping of the world's more developed countries, has for decades published country-level financial and physical indicators on such topics as macroeconomics, trade, industry, and agriculture. It also began an effort, in the 1980s, to develop and collect social indicators, starting with health care.

Turning its attention next to education, OECD launched the International Indicators of Educational Systems project in 1987. Several international groups of experts developed conceptual frameworks, agreed on definitions, and executed pilot studies to determine the set of possible indicators that best illustrated the condition of education in the OECD countries. In 1992, the OECD published a set of indicators, employing data from the late 1980s, in *Education at a*

Glance. An updated second edition of *Education at a Glance* was released in December 1993, and work on successor volumes is already under way.

Released in December 1993, *Education in States and Nations: Indicators Comparing U.S. States with the OECD Countries in 1988* is an indicators report comparing the U.S. states with the OECD countries. We see it as the logical next step and companion volume to *Education at a Glance.* It allows not only state-with-state and country-with-country comparisons, but state-with-country comparisons. For perhaps the first time, states can compare their support for education, the participation of their youth in the education system, and their educational outcomes with those of a number of industrialized countries, including some that may be quite similar in size or wealth. In other words, on a variety of measures, education in U.S. states can now be judged internationally. Recent attention, for example, has focused on how international assessment data show U.S. students stacking up fairly well in basic reading literacy but behind our international competitors in math and science achievement.

One way we can bring financial information to bear on this issue is to ask: Can the differences in achievement be explained by variations in public investment? Do differences in resources invested by nations and states in education contribute to the differences in achievement? Likewise—on a larger scale—observers of education policy ask whether public investments in education can explain some of the differences in economic achievement and worker productivity among countries.

The Finance Indicators

Financial support for education can be viewed from several angles, each of which focuses only on certain issues. For example, total expenditure on education is useful for determining who spends the largest sum of money on education but may be misleading when comparing small countries or states with larger ones. A small country can spend less in the aggregate but may spend more per student. Likewise, a poorer country may spend as much per student as a richer country, in which case some would say it is making a greater effort to educate its citizens. However, that would not be apparent by simply looking at aggregate spending or per-student spending.

At NCES, moreover, we focus on expenditure from public sources rather than on total education investment, which would include money from private sources. In some cases, expenditure from private sources amounts to a substantial portion of total educational expenditure. However, financial data on private education are not available from some countries.

Because there is no universally superior measure of public financial support for education, several indicators are presented in *Education in States and Nations: Indicators Comparing U.S. States With the OECD Countries in 1988.* The three most important indicators are:

1. **Public expenditure on education divided by the number of students enrolled in education, including those enrolled in private schools**

Current public expenditure per student is a measure of the public investment in each student in the education system. In comparing public financial support for education across countries, we want to take into account the size of the student populations they are attempting to educate. But it would be a mistake to account only for those students enrolled in public schools. The distinction between public and private education is not as clear in other countries as it is in the United States. For instance, in France, elementary and secondary schools run by the Roman Catholic Church receive public operating subsidies, and their teachers are paid directly by the federal government as civil servants. Revenue from the federal government for these schools is

truly *public* support for education that, in France, just happens to follow students into the private sector.

2. The same expenditure expressed as a percentage of gross domestic or state product

Gross domestic product (GDP) is an aggregate measure of the value of goods and services produced in a country and is thus a measure of a country's wealth; gross state product (GSP) is the same measure applied to a U.S. state. Calculating public expenditure as a percentage of GDP or GSP allows us to take into account the wealth of a nation or state when comparing its public support for education with that of other countries or states.

3. The first measure divided by gross product per capita

This indicator combines elements of the previous two, calculating public expenditure per student as a percentage of gross product per capita. This measure has been described by some analysts as a fiscal effort index. It attempts to tie the relative size of the student population and the relative wealth of a country or state into one indicator of financial support for education. In a sense, it adjusts public expenditure per pupil by taxpayers' ability to finance a larger education budget.

Which Countries and States Provide the Most Financial Support to Education?

The first of the finance indicators, annual public expenditure per student (figure 1), presents the amount of *public* financial support for a student's education in each country or state.

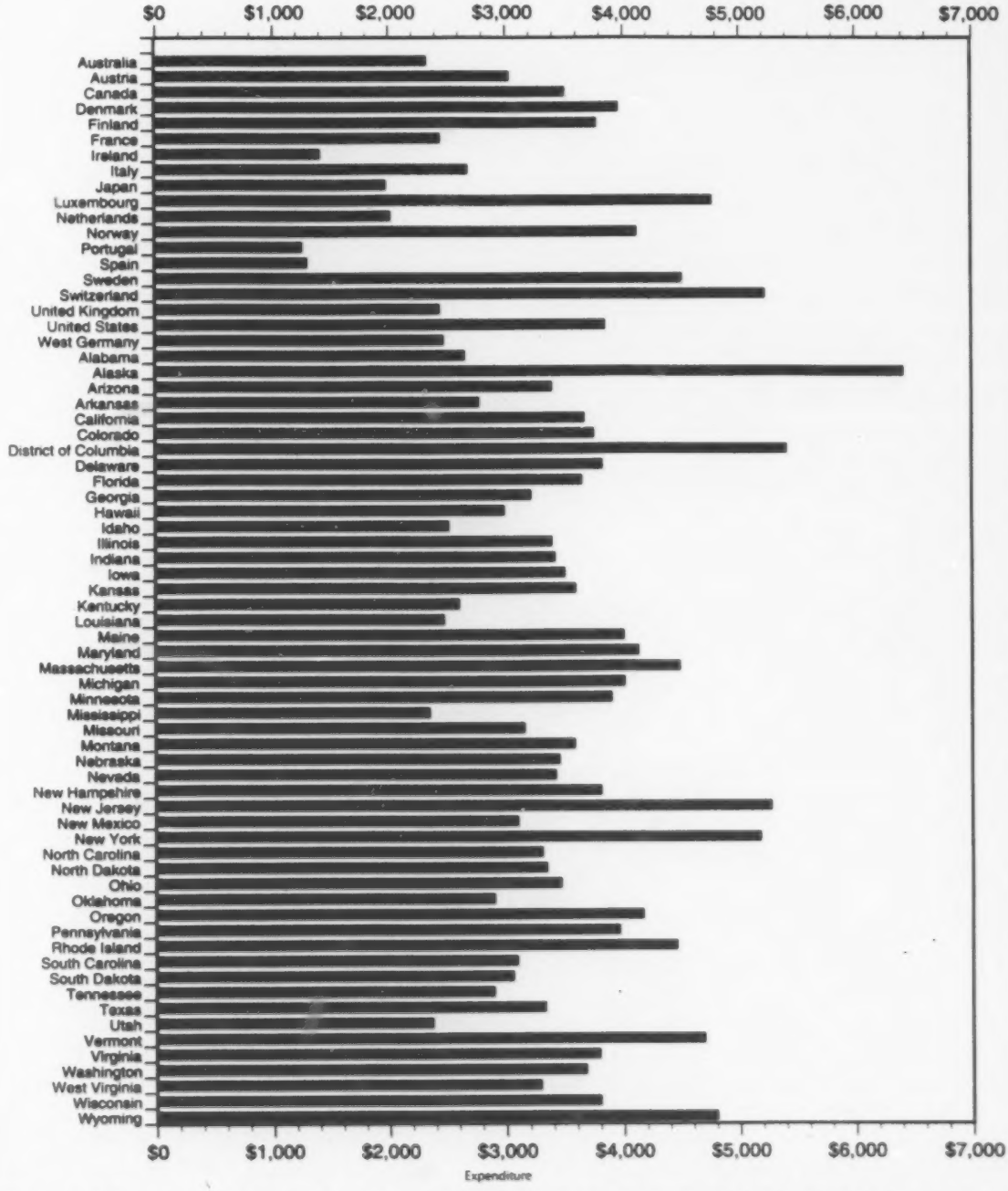
- For the preprimary through secondary grades, Switzerland had the highest level of per-student expenditure among the OECD countries, and Alaska, Connecticut, New Jersey, and New York had the highest levels among states.
- The United States spent more per student at the preprimary through secondary levels than any of the other G-7 countries.

An advantage of using per-student expenditure as an indicator of a Nation or state's financial efforts to support education is that it takes into account the size of the student population. A disadvantage is that much of the variation between states and countries may in fact be caused by their relative wealth.

The second finance indicator, annual public education expenditure as a percentage of GDP or GSP (figure 2), attempts to show how much states and nations spend on education in terms of the economic resources that are available to them. Variations in this measure across countries and states reflect differences in income levels as well as national priorities or preferences. Of this measure:

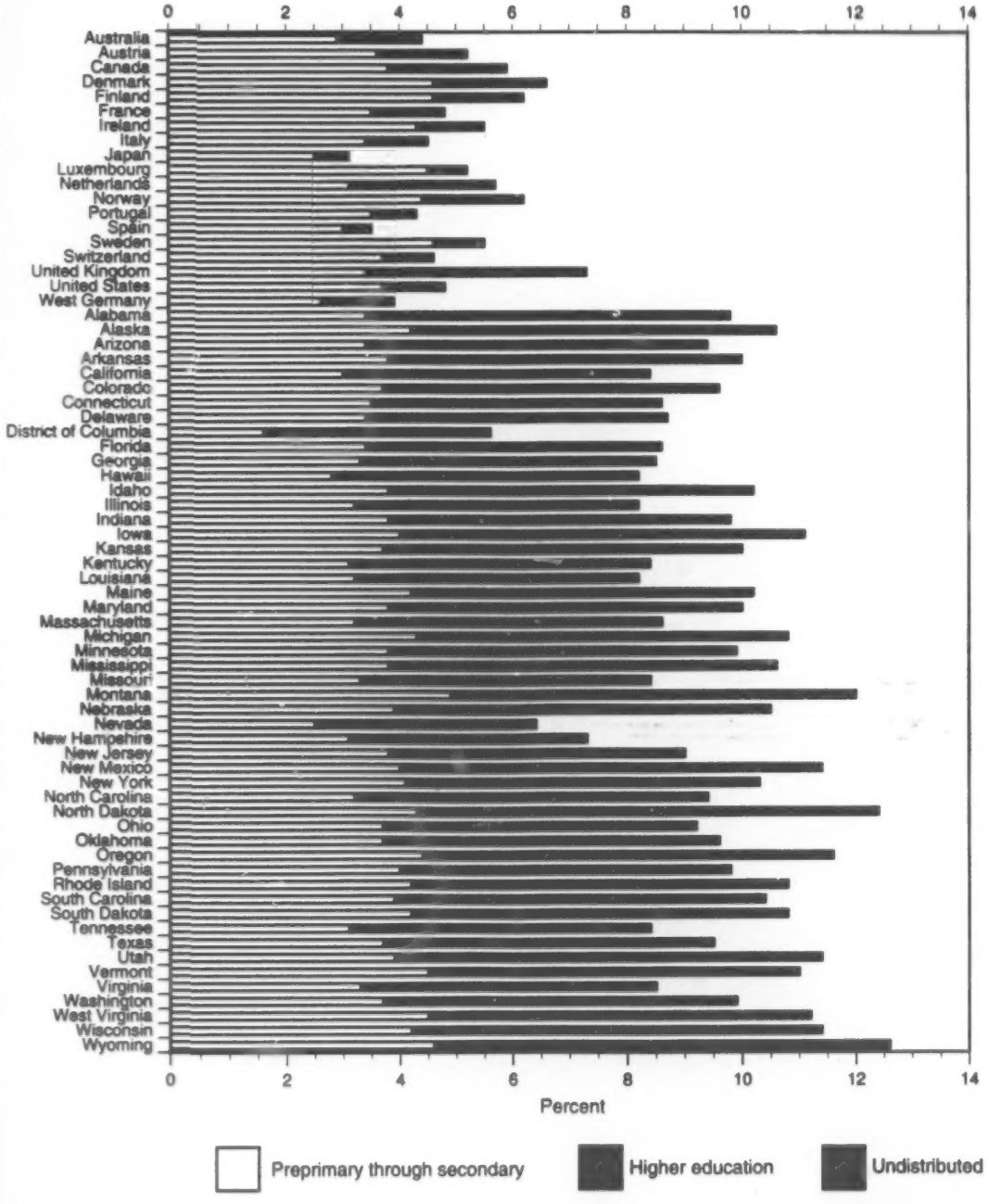
- Denmark had the highest level of education expenditure as a percentage of GDP, and Japan the lowest.
- Only one G-7 country, Canada, had a higher level of current public expenditure as a percentage of GDP than did the United States. France's level was the same as that of the United States.
- The ranges of values for states and for countries were quite similar. Montana, North Dakota, Wyoming, Denmark, Finland, and Norway had the highest levels of educational expenditure as a percentage of GDP or GSP (6.0 percent or higher). The lowest levels were found for Spain, Nevada, and Japan (3.5 percent or less).

Figure 1.
Public expenditure per student on preprimary through secondary education by selected country and U.S. state: 1988 (U.S. dollars)



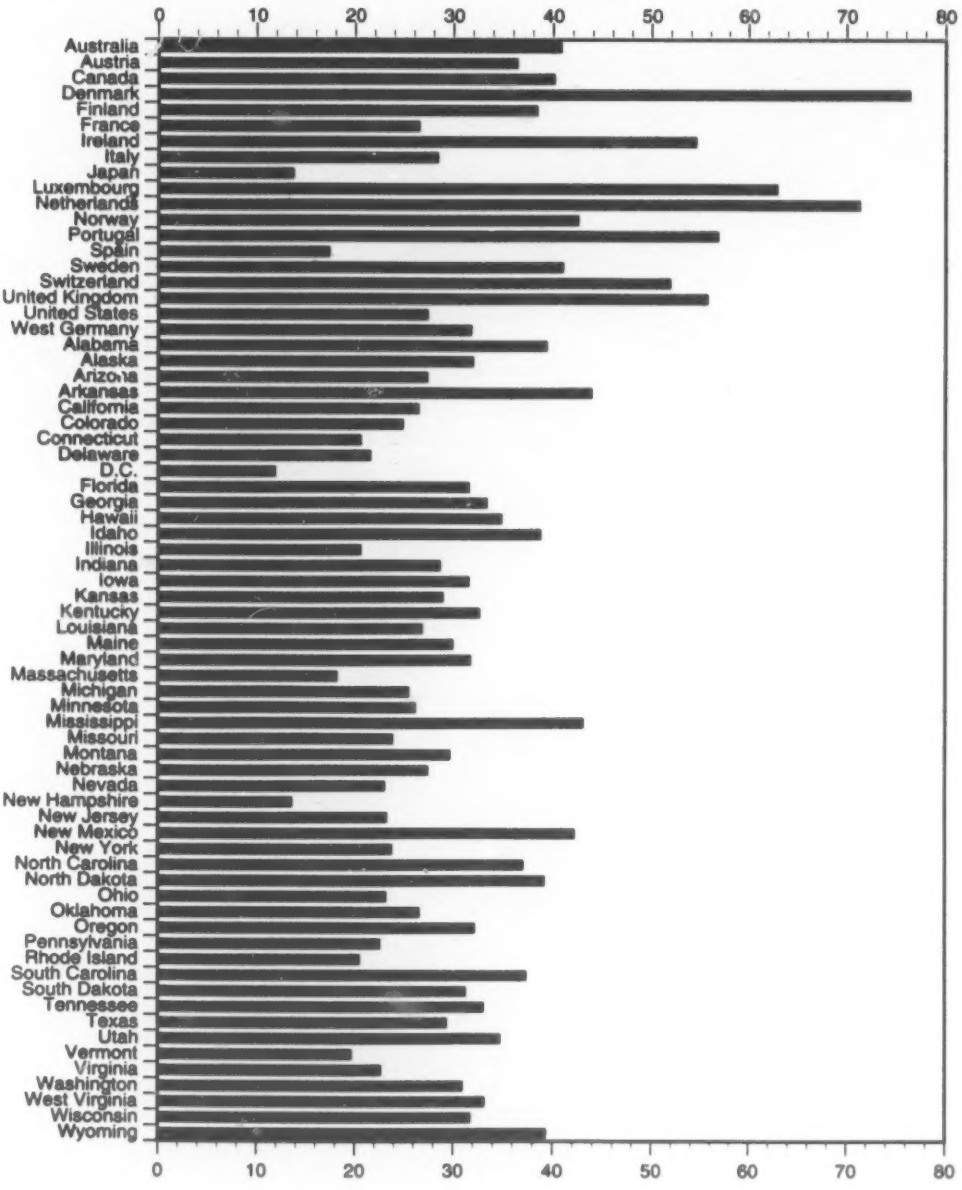
SOURCE: U.S. Department of Education, National Center for Education Statistics, Common Core of Data Survey, 1988-89, and Schools and Staffing Survey, 1987-88. U.S. Department of Commerce, Bureau of the Census, 1990 Census of the Population. Organization for Economic Cooperation and Development, Center for Educational Research and Innovation. International Indicators Project, 1992. International Monetary Fund, Bureau of Statistics, *International Financial Statistics*, December, 1988.

Figure 2.
Public expenditure per student on education as a percent of gross domestic or state product by selected country and U.S. state: 1988



SOURCE: U.S. Department of Education, National Center for Education Statistics, Common Core of Data Survey, 1988-89; Financial Statistics of Higher Education Survey, 1988-89; and Integrated Postsecondary Education Data System Finance Survey, 1988-89. *Statistical Abstract of the United States*, 1992, Table 684. Organization for Economic Co-operation and Development, Center for Educational Research and Innovation, International Indicators Project, 1992.

Figure 3.
Public expenditure per student for preprimary through secondary education as a percent of gross domestic or state product per capita, by country and U.S. state: 1988



SOURCE: U.S. Department of Education, National Center for Education Statistics, Common Core of Data Survey, 1988-89, and Schools and Staffing Survey, 1987-88. U.S. Department of Commerce, Bureau of the Census, Current Population Reports, Series P-25, No. 1058, State Population and Household Estimates: July 1, 1989, and Census of the Population. *Statistical Abstract of the United States*, 1992, Table 634. Organization for Economic Cooperation and Development, Center for Educational Research and Innovation, International Indicators Project, 1992.

Annual public education expenditure per student does provide a measure of a nation's or state's spending on education in relation to its available resources, but it is also highly influenced by the size of the student population. All other factors being equal, a country or state with a small student population is likely to spend a smaller portion of its GDP or GSP on education than is a country with a large student population. Thus, the third finance indicator (figure 3), annual public education expenditure per student as a percentage of GDP or GSP per capita, provides a measure of fiscal effort to support education that takes into account both a country's or state's available financial resources and the size of its student population. It is calculated by dividing the first finance indicator, expenditures per student, by a nation or state's per capita GDP or GSP.

On this measure, per-student expenditures for some high-spending states and countries appeared to be lower when their available resources were taken into account:

- Alaska, Connecticut, and New Jersey, the three states with the highest per-student expenditures, were not as high in terms of ratio of per-student expenditure to per-capita GSP. The states with the highest ratios were Rhode Island, Vermont, Oregon, and Montana.
- On the other hand, the OECD countries with the highest per-student expenditures (Switzerland, Luxembourg, and Sweden) remained among the highest-ranking OECD countries even when available resources were taken into consideration.
- The standing of the G-7 nations in relation to one another changed little. However, Canada's 1988 per-student expenditure relative to its GDP at the preprimary through secondary levels (19.7) was higher than that of the United States (19.6), even though its per-student expenditure at that level was lower ($3,508 compared with $3,843).

What Do These Measures Tell Us?

The United States as a whole generally invested more public money in its students than most of its G-7 counterparts (see figure 1). Public expenditure per student at the preprimary through secondary levels in the United States was $3,843 in 1988. This was more than the $3,508 spent by Canada and considerably more than per-student expenditures in the other G-7 countries—West Germany, Japan, France, Italy, and the United Kingdom.

The United States also appears to have invested strongly in students by comparison with the OECD countries. Whereas nine of 19 OECD countries spent less than $2,500 per student from public sources at the preprimary through secondary level, the only states who spent below that level were Louisiana, Mississippi, and Utah. At the other end of the scale, Alaska, Connecticut, and New Jersey spent more at the preprimary through secondary level than Switzerland, the OECD country with the highest per-student expenditure at that level.

The United States, however, appears to have devoted a share of its public resources to education about equal to that of most of its G-7 counterparts (see figure 2). The U.S. public expenditure for education at all levels was five percent of the GDP in 1988. This was lower than the percent for Canada and higher than the percent for Japan or West Germany. The percent of GDP spent on education in France, Italy, and the United Kingdom was similar to that of the United States.

The range of public expenditure on education as a percentage of gross product among the U.S. states mirrored the range among the OECD countries. Public preprimary through secondary spending ranged from less than 3 percent of GSP in Hawaii and Nevada to 4.5 percent or more in

West Virginia, Wyoming, Vermont, and Montana. The range across OECD countries was similar. Australia, West Germany, and Spain spent 3 percent or less of GDP on preprimary through secondary education, while Denmark, Finland, Luxembourg, and Sweden all spent 4.5 percent or more.

The United States appeared to make a strong fiscal effort toward education; at the preprimary through secondary levels, per-student spending in 1988 was nearly 20 percent of its GDP per capita (see figure 3). Of the G-7 countries, Canada had a similar percentage. Italy had the third highest percentage—at 19—even though it had fewer resources than all of the other G-7 countries, bearing the lowest GDP per capita. The United Kingdom, France, West Germany, and Japan all spent less per pupil as a proportion of their GDP per capita.

The range in this measure of fiscal effort was generally as wide among the states as it was among the countries, sandwiched between a group of northern European countries (plus Switzerland and Luxembourg) and a group of low-spending countries, including Spain and Japan.

The states with the highest preprimary through secondary expenditures relative to their GSPs per capita (24 percent or greater) were Rhode Island, Oregon, and Vermont. This level of spending was most similar to that of Switzerland, Finland, Norway, and Denmark. Three states—Hawaii, Louisiana, and Nevada—had preprimary through secondary expenditures between 14 and 15 percent of their per capita GSPs, the lowest of the states. The OECD countries with the lowest levels—Spain, the Netherlands, and Japan—spent between 12 and 15 percent of their per-capita GDPs on preprimary through secondary education.

Discussion

The United States does not appear stingy in its public investment in education by comparison with other large industrialized countries. It ranks among the highest spenders of the G-7 countries on all three finance indicators described here. More astute observers of education policy, however, will inevitably ask about indicators the following: What do they tell us of the *cost effectiveness* of these public investments in education? Which countries are getting the most "bang for their bucks?" Which countries educate their pupils in the most efficient manner?

Just as inevitably, eyes will be drawn to the relatively low public investment in education of Japan and West Germany, inducing some to ask how they can produce a demonstrably better-educated population despite investing demonstrably fewer public resources.

Education in States and Nations affords us the means to identify the Germanies and Japans among us in our own 50 states. Among the states that have made relatively smaller public investments in education but seem to have achieved relatively better results on achievement tests are New Hampshire, Utah, North Dakota, Idaho, Massachusetts, and Minnesota. Perhaps we can learn some pointers on improving education from them, just as we can from other countries.

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International Comparison of Teacher Salaries and Conditions of Employment

F. Howard Nelson
American Federation of Teachers

About the Author

F. Howard Nelson, Associate Director of Research for the American Federation of Teachers (AFT), has a masters degree in economics and a Ph.D. in educational policy studies from the University of Wisconsin. He prepares the annual 50-state salary survey of the AFT, as well as other compensation surveys. Among his responsibilities, Dr. Nelson specializes in analyzing budgets and private contacting in public schools. Prior to his position at the AFT, Dr. Nelson taught in the Department of Policy Studies at the University of Illinois at Chicago for several years and has published about two dozen articles in refereed journals.

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Introduction

Recent commentary on American education has focused on what we can learn from our international competitors that will help improve our education system. At first, these comparisons tended to be simplistic, but more recent reports have begun to illuminate the nuances of difference between education in the United States and that in other advanced industrialized nations by looking at how the conditions in which teachers teach and students learn influence their success.

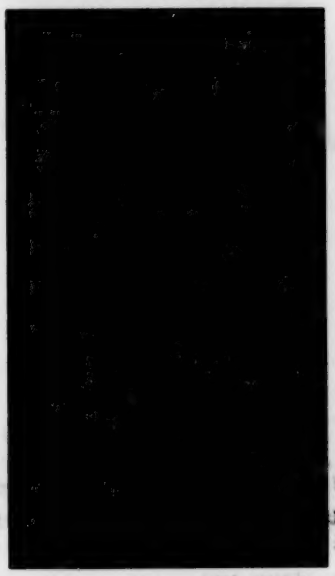
Inevitably, the discussion turns to teacher salaries. Teacher salaries and working conditions exert a strong influence on an education system. Salaries are the single largest component of educational costs in any nation, and they affect teacher recruitment, retention, and quality. Good teacher working conditions can make a vital contribution to education success, and poor working conditions create nearly insurmountable obstacles to student learning.

This chapter summarizes the findings of the 127-page American Federation of Teachers (AFT) study, *How U.S. Teachers Measure Up Internationally: A Comparative Study of Teacher Pay, Training, and Conditions of Service* (Nelson and O'Brien 1993). The AFT study was based on previous studies of teacher pay and working conditions, as well as national salary schedules or statistical salary data obtained by the AFT through foreign embassies here, U.S. embassies abroad, teacher unions in foreign countries, and foreign government education agencies responsible for collecting or distributing data. Data from 19 of the most economically advanced countries are included; information on every measure was not available from every country.

Data and Methodology

While the United Nations Educational, Scientific, and Cultural Organization and the Organization for Economic Cooperation and Development regularly publish education spending data, no organization regularly produces teacher pay and working conditions comparisons. Three international teachers' union studies frequently referenced in this report are 1) studies of teacher pay and working conditions in 1986 and 1991 by the World Confederation of the Organizations of The Teaching Profession (WCOTP); 2) a 1991 study by the International

Federation of Free Teachers Unions (IFFTU); and 3) a 1988 report for European countries, jointly commissioned by the Commission of the European Communities (1988) and the Netherlands Ministry of Education. Each study presented beginning and maximum salaries in national currency, and the WCOTP study converted salaries to Swiss francs. The EC study contained numerous forms of salary comparisons, including a comparison of teacher salaries with per capita gross domestic product and a currency conversion using both exchange rates and purchasing power parities (PPPs). None of these studies included economically advanced nations outside of Europe, such as the United States, Canada, Japan, and Australia.



Under a grant from the U.S. Department of Education, Barro and Suter (1988) studied several economically advanced nations, including the United States, Japan, and Canada, with the explicit purpose of comparing teacher salaries. Salaries were compared with per capita gross domestic product (GDP) and converted to U.S. dollars using PPPs.

In this study, national salary schedules or statistical salary data in federated countries (i.e., the United States, Canada, Australia, and Switzerland) were requested from several sources including: 1) foreign embassies in the United States, 2) U.S. embassies in foreign countries, 3) teacher unions in individual foreign countries, and 4) foreign government education agencies responsible for collecting or distributing data. Multiple requests were necessary because of the difficulty of obtaining data from numerous nations and because of the difficulty in interpreting the data once obtained. Economic data needed for comparative purposes (e.g., GDP, PPPs, etc.) were obtained from the Organization for Economic Cooperation and Development, the U.S. Department of Labor, and various other sources.

The foundation of the salary comparisons are the national, state, regional, or provincial salary schedules (see table 1). The starting, mid-career (15 years), and maximum gross salaries were identified. To the fullest extent possible, the bonuses, stipends, supplements, and overtime received by most teachers were included. The gross salary figures omitted fringe benefits and employer-paid contributions to pension funds and national social security. Except for Japan, salary data apply to 1992. While most salary schedules took effect in January 1992, the effective dates ranged from September 1991 to June 1992.

Though applicable to all nations, the structure of the comparisons in this study is oriented toward a U.S. audience. The average U.S. teacher has 16 years of experience, is 41 years old, and has a family with one child living at home (National Education Association 1992). Therefore, the mid-career salary comparison is made at the 15th year on the national salary schedule, even though the concept of mid-career probably varies from nation to nation in terms of age and experience. More than half of all U.S. teachers have master's degrees, although these degrees frequently fall outside of their teaching fields.

The approach to summarizing the salary data for comparative purposes conforms to the approach taken in the salary appendix of *The Conditions of Service of Teachers in the European Community* (Commission of the European Communities 1988). In the Commission's study, teacher salaries were compared not only at the starting and maximum levels, but also at ages 32 and 46. Salaries were annualized, and major bonuses, stipends, and supplements were included in the comparison. This approach is preferable to the presentation of monthly basic salaries, which is usually given for starting and maximum salaries (WCOTP 1986, 1991). The problem with statistics on monthly salaries is that they are sometimes paid over 13 months (Germany, the Netherlands) or 14 months (Austria) and usually do not include large annual bonuses (of as much as 4.5 months of salary in Japan). Basic salary schedules often omit sizable family,

Table 1.
Teacher salary[1] data, United States and Selected Nations

	Effective date	Grade, lane, or education requirement[1]		
		Primary	Lower secondary	Upper secondary
United States	Sept. 91	[2]National mean	[2]National mean	[2]National mean
Non-European				
Australia (New South Wales)[3]	June 92	4 years	4 years	4 years
Canada (Toronto)	Jan. 92	[4]Category A2, A3, and A4	[4]Category A2, A3, and A4	[4]Category A2, A3, and A4
Canada (Saskatchewan)	Jan. 92	[4]Category 4, 5 and 6	[4]Category 4, 5, and 6	[4]Category 4, 5, and 6
Canada (Quebec)	Jan. 92	[4]Category 16, 17 and 18	[4]Category 16, 17, and 18	[4]Category 16, 17, and 18
Japan[5]	Apr. 91	National salary schedule	National salary schedule	National salary schedule
British Isles				
England and Wales	Apr. 92	([6])	([6])	([6])
Ireland	Apr. 92	[7]Pass or thesis	[7]Pass or thesis	[7]Pass or thesis
Scotland[8]	Apr. 92	Ordinary qualifications	Ordinary qualifications	Ordinary qualifications
Central Europe				
Austria[9]	Jan. 92	L2b3	L2a2	L1 *(Magister)*
Belgium[10]	Nov. 91	148	301	501
France[11,12]	Jan. 92	*Instituteurs (petit)*	N/A	N/A
France[11,12]	Jan. 92	*Professeurs des écoles*	*Professeurs des écoles*	*Professeurs des écoles*
France[11,12]	Jan. 92	*Grand choix* (30 percent)	*Grand choix* (30 percent)	*Grand choix* (30 percent)
France[11,12]	Jan. 92	N/A	N/A	[13]Extra class
France[11,12]	Jan. 92	N/A	N/A	*Professeurs agrégés*
Germany[14]	Jan. 92	A12	A13	A14-*Gymnasium*
Italy	July 92	Scale 6	Scale 7	Scale 7bis (thousands)
The Netherlands[15]	Jan. 92	Scales 6-9	Scales 7-10	Scales 10-12
Spain	Jan. 92	EGB	Education General Basica	Bachilerato Formacion Professional
Spain	Jan. 92	N/A	N/A	*Catedratics* BUP
Switzerland, urban	Jan. 92	[16]*Primaire*, Basel	[16]*Secondaire*, Basel	[16]*Gymnase*, Basel
Switzerland, rural	Jan. 92	[16]*Primaire*, Glaris	[16]*Secondaire*, Glaris	[16]*Gymnase*, Glaris
Switzerland (Zurich)	Jan. 92	[16]*Primaire*	[16]*Secondaire*	[16]*Gymnase*
Northern Europe				
Denmark[17]	Apr. 92	Rate VI (Copenhagen)	Rate VI (Copenhagen)	[18]*Magister*
Denmark[17]	Apr. 92	Rate II (rost rural)	Rate II (rost rural)	N/A
Finland[19]	May 91	c42	c51	c53
Finland[19]	May 91	c46 (university graduate)	N/A	N/A
Norway[20]	Jan. 92	*Adjunkt*	*Adjunkt+*	*Lektor*
Sweden	Apr. 92	Primary	*Adjunkt*	*Lektor*
Selected non-OECD nations				
Hong Kong[21]	Apr. 92	Teacher training graduate	University graduate	University graduate
Taiwan	1992	([22])	([22])	([22])
Taiwan	1992	[22]"A" bonus	[22]"A" bonus	[22]"A" bonus
India [23]	1992	Primary Teacher Basic	Trained Graduate Teacher Basic	Post-graduate Teacher Basic
Pakistan[24]	1992	Primary Teacher Certificate Basic	Teacher Certificate Basic	Trained Graduate Teacher Basic

1 All figures in footnotes refer to national currency, not U.S. dollars.
2 Primary and secondary teachers are paid the same. The average teacher in the United States has a master's degree. The maximum salary usually requires a doctorate (earned by about one percent of teachers).
3 Top of basic schedule reached in 9 years ($18,950); higher salary limited to 30% of all classroom teachers.
4 Starting salary is a 4-year degree; mid-career is a 5-year degree. Categories refer to starting, mid-career, and maximum salary assumptions.
5 Starting salary is bachelor's degree; mid-career and maximum is master's degree. To account for bonuses and supplements, 64 percent is added to the primary base scale and 66 percent is added to the secondary base scale (see Barrow, 1986).
6 Incentive scale added to mid-career salary at all levels; added to maximum at primary level; added to maximum at lower secondary level; and added to maximum at upper secondary level.
7 Mid-career teacher includes master's degree (867) and high school diploma in education (209); first or second honors is about $1,500 more.
8 Mid-career and maximum salary applied to "senior teachers" or "assistant principal teachers"; levels reached no sooner than 13 years.
9 Monthly salary multiplied by 14 plus supplements for *Dienstzulagen* group III multiplied by 4.
10 Includes housing, holiday bonus (27,009 plus 1 percent), and year-end bonus (8,955 plus 2.5 percent).
11 Includes housing stipend of $1,100/month for *instituteurs* and average allowances and overtime payments of 7.8 percent for *instituteurs*, 5.6 percent for *professeurs des écoles*, 14.4 percent for *professeurs certifiés*, and 21.1 percent for *professeurs agrégés*.
12 About 30 percent advance on very fast track (20 years) and about 50 percent on the fast track (25 years). *Instituteurs* average 22 years to the top.
13 A small number of experienced teachers qualify for a non-permanent promotion to "extra class."
14 Includes supplement for married with one child. Monthly salary multiplied by 13.
15 Includes 8 percent holiday allowance. Teachers shift scales as they gain experience.
16 Each of the 26 cantons has its own salary schedule. Basel is typical urban; Glaris is low-paying rural. Mid-career salaries evaluated at 12 years. Figures include allowances for a family with one child.
17 Average supplements of 5,743 included.
18 American Federation of Teachers (AFT) estimate based on recent International Federation of Free Teachers Union (IFFTU) (1991) study.
19 Includes estimated overtime (primary is 13 percent, lower secondary is 18 percent, and secondary is 22 percent).
20 Includes fixed overtime (primary is 2 percent, lower secondary is 4 percent, and secondary is 16 percent), but not variable overtime.
21 Base scale only; may not include important bonuses.
22 "A" bonus is limited to fixed percentage of teachers in each school.
23 Includes compensatory allowance (45-100/month) and house rent allowance (260-600/month) for large cities.
24 Includes main city pay bonus of 40 percent of starting salary.

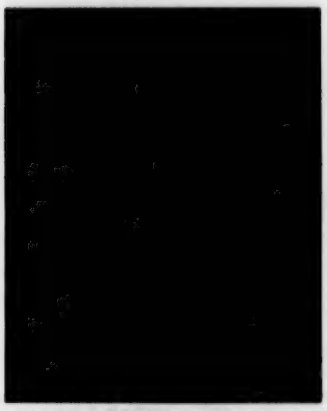
SOURCE: Nelson and O'Brien (1993)

housing (cost of living), and other significant allowances. Overtime pay is also a significant aspect of remuneration for teachers in some nations.

In addition to these general procedures for comparing salaries, several characteristics specific to each nation should be noted.

United States

Starting and mid-career salaries are statistical estimates based on data collected by the AFT (Nelson 1992) from the 50 U.S. states. These data are likely to include supplements, bonuses, incentive pay, most pension pick-ups, and occasional extra pay for extra duties. For 1987-88, an estimate of average "base contract pay" (U.S. Department of Education 1992) was about 9 percent less than the average salary figures reported by state governments by the National Education Association (1992a) and AFT (Nelson, 1992). Fewer than one percent of teachers reach the maximum salary, which usually requires a doctoral degree.



Australia

In recent years, salary scale differences among Australia's six states have almost disappeared. A majority of the Australian population live in either New South Wales or Victoria. The New South Wales data are highly representative of other states. The maximum salary figures include an extra step for Advanced Skills Teachers (worth about $900 U.S.), even though only 30 percent of teachers can be awarded the extra step.

Canada

Canadian salaries vary by province and sometimes by city or area within a province. The following comparative tables contain salary data for Saskatchewan, Ontario, and Quebec. Saskatchewan represents a typical province; Ontario, especially Toronto, pays above average. Quebec, New Brunswick, Prince Edward Island, and Newfoundland pay less than the other provinces.

Denmark

Beginning in 1993, *folkeskole* teachers (those teaching students ages 6 to 16) began negotiating with municipalities rather than the central government, making some teacher duties negotiable on a local basis. The salary schedule also dropped from 19 to 17 years in length.

England and Wales

Although primary and secondary teachers have the same base pay schedule, secondary teachers tend to be more highly paid because they are much more likely to receive "incentive allowances." The incentive allowance assumptions delineated in table 2 are based on statistical data regarding what kind of teachers get incentive allowances. In recent years, England instituted a system of selective payments to increase flexibility and improve recruitment and retention. Pay flexibilities include: 1) appointing "older" starting teachers higher up the scale, 2) appointing two steps higher on the scale for teachers in high demand areas, 3) accelerated incremental step progression, 4) incremental enhancement for those not at the top of the scale, 5) discretionary scale points for those at the top of the scale, and 6) incentive allowances. Local education agencies and governing bodies—not the central government—implement the pay flexibilities. Through 1991, fewer than 2,000 teachers had received incremental enhancement available to those not at the top of the scale (worth $300 to $1,200) or discretionary scale points for those at the top of the scale (worth up to $3,200).

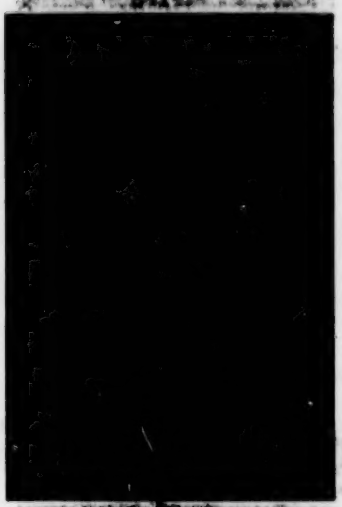
Finland

The higher of the two Finnish primary teacher salaries applies to teachers educated under the "new" university-based teacher education system. As a result of a 4-week strike in 1984, teachers with a university-based degree received higher

pay. New school laws in 1991 resulted in more negotiations at the local level, but not on matters of salary.

France

France has several categories of teachers, including *professeurs des écoles, instituteurs,* and *professeurs certifiés.* The category of *professeurs des écoles* (school teachers) was created for primary teachers in 1989 after an extensive union action. Salaries were increased and unified with the most important category of secondary school teachers, called *professeurs certifiés* (certified teachers). Until this action, primary students were taught by *instituteurs* (schoolmasters). Within each category, all teachers have the same starting pay and the same maximum pay, but some teachers—based on supply and demand considerations as well as teaching evaluations—can advance to maximum pay in 20 years, while others could take as long as 30 years. About 20 percent of teachers advance at the fastest rate (*grand choix*), about 50 percent at the average rate (*mi-choix* or *petit choix*) of 25 years, and 20 percent based solely on years of experience or length (*ancienneté*).



Germany

By description, those under the German salary schedule typically take 28 years to reach the maximum salary level. However, because years in teacher training count toward seniority, primary teachers generally start on step 3 (reaching the maximum in 22 years), and secondary teachers start at step 4 (reaching the maximum in 21 years). Every teacher receives an *Ortszuschlag,* or family allowance—even single teachers—based on family size. Monthly salaries are received 13 times a year.

Ireland

Ireland has a 15-step salary schedule with longevity steps at 18, 22, and 26 years. Teachers with outstanding academic credentials (first or second honors) get paid about $1,600 (U.S.) more at every step on the salary schedule.

Japan

Salaries include statistical estimates of bonuses and allowances equal to 64 percent at the elementary level and 66 percent at the secondary level, of which about two-thirds is an annual bonus equal to 4.5 months' salary.

The Netherlands

Studies report 26 annual steps on the secondary teacher salary schedule, but teachers advance through the steps in a way that results in a 23-step schedule at the lower secondary level and 21 steps at the upper secondary level.

Scotland

Although part of the United Kingdom, Scotland has its own education system and salary schedule like a state, province, or canton in a confederated system of governance. Scotland has a 10-step basic salary schedule, but about half of secondary teachers have "promoted" posts. Primary teachers can be designated as "senior teachers" and advanced past the maximum of the basic schedule.

Sweden

Prior to 1988, teachers were trained and paid separately for grades 1-3, 4-6, and 7-9. These categories were consolidated into two overlapping categories for teachers of students in grades 1-7 and 4-9. Training requirements were increased for primary teachers.

Switzerland

With different salary schedules in each of this small country's 26 cantons, Switzerland is nearly as decentralized as the United States when it comes to teacher pay. The comparative tables contain data for three cantons: Zurich is Switzerland's highest-paying canton; Basel is a

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typical urban canton; and Glaris is a typical rural canton. Note that mid-career salaries represent a teacher with 11 years of experience, not 15 years as in the other comparisons.

Findings

An analysis of teacher pay must consider training and working conditions. Other things being equal, teachers with more training should be paid more. Teachers with more demanding working conditions, such as a large class, should be more highly remunerated. Similarly, teachers working longer weeks and longer years deserve higher pay. Supplemented by information obtained from individual countries, tables 2 and 3 synthesize data on working conditions from several international studies. Because data from several years and different sources are synthesized, the information should be considered as generally applicable rather than definitive.

Class Size

U.S. primary teachers have smaller classes than teachers in Japan, Spain, and Ireland, but their classes are similar in size to those in England and the Netherlands (see table 2). Teachers in other nations have smaller classes. While Japanese teachers have larger classes, they also spend less time in the classroom than do their U.S. counterparts. A considerable amount of their workweek is devoted to planning and preparation for teaching. Most European teachers also spend less time in the classroom and more time preparing for teaching.

The U.S. has an average primary class size of 24 but a pupil-teacher ratio of 19.3:1 (the pupil-teacher ratio is the sum of all students divided by the sum of all teachers and differs from class size because of variations in teaching loads, teaching assignments, the number of classes per student, and other factors). Japanese primary teachers have classes of about 30 students, but because students take about six classes and teachers teach about four classes, the pupil-teacher ratio of 21.6 is only two students larger than the U.S. figure of 19.3.

For nations with data at the secondary level, U.S. class size appears average. But U.S. teachers teach more classes and, therefore, more students per day. Class size is larger in Japan, Finland, Spain, Austria, and France at the upper secondary level, but teachers in each of these nations teach fewer classes than in the United States. Japan, Germany, and the Netherlands have larger classes at the lower secondary level.

Workweek and Work Year

U.S. primary teachers spend more time with students than teachers in any other nation studied (see table 3). Excluding duty-free lunch time and preparation periods, U.S. primary teachers spend over 30 hours per week in contact with children. Japanese teachers spend only 17-20 hours a week in front of students, and German teachers spend 21 hours a week in instruction. Secondary teachers in England, Scotland, Ireland, the Netherlands, and the United States have the largest number of instructional hours per week—approximately 5 classes a day for 5 days. U.S. secondary teachers easily have the highest number of required work hours per week in all activities.

Teachers in the United States annually work an average of 185 days, compared with an international average of 190 to 195 days. All of the nations with more than 200 school days per year teach on Saturday mornings rather than teach in more weeks of the year. None of these nations, however, requires teachers to teach more hours per week (including Saturday hours) than U.S. teachers. Every nation studied has between 12 and 15 weeks of vacation, or "holidays" (counting fall, spring, and winter breaks), except Italy, which has 17 weeks.

Table 2.
Class size and pupil-teacher ratio

	Pupil-teacher ratio (a)					Average			
						Class size (b)		Class size (c)	
	UNESCO primary	OECD (d) primary	OECD (d) S1/S2	AFT (d) all levels	Level	Maximum	Average	1985	1990
United States	21	***19.3	***15.2	18.4	P	None or varies locally	24.0	24	24.0
					S1		26.8	27	26.8
					S2		25.6	25	25.6
Canada	16	16.6	15.3	17.1	P	None or varies locally	20	*16.6	*15.6
					S1		23		
					S2		24		
Japan	21	21.5	18.2	20.7	P	N/A	30.3	N/A	N/A
					S1		36.5		
Australia	19	18.2	12.7	15.7	N/A	N/A	N/A	N/A	N/A
Austria	11	11.3	10.8	11.9	P	31	25	N/A	N/A
					S1/S2	35	31		
Belgium	15	N/A	8.3	11.9	N/A	N/A	N/A	N/A	N/A
Denmark	12	11.7	11.1	**12.2	S1	28	21	18.6	18.1
					S2	28	N/A		
England andWales	20	21.4	16.5	16.5	P	N/A	25	N/A	N/A
					S1/S2	N/A	16		
Finland	14	N/A	N/A	**15.6	P	25	20	21.9	20.7
					S1	32	28	21.9	20.7
					S2	36	32	28.5	28.2
France	14	17.0	13.4	17.7	P	30	23	21.5	22.4
					S1	30	24	26.3	28.8
					S2	40	29	29.9	31.5
Germany	18	N/A	N/A	19.1	P	30	23	27.9	21.6
					S1	35	28	28.4	26.6
					S2	25	22	28.4	26.6
Ireland	28	13.7	17.5	**15.6	P	N/A	N/A	32.1	31.0
Italy	10	12.8	9.2	**11.0	P	30	25	N/A	N/A
Netherlands	17	19.1	20.0	18.7	P	32	25	N/A	N/A
					S1	36	28		
					S2	36	24		
Norway	16	N/A	20.9	10.2	P	28	19	N/A	N/A
					S1	30	24		
					S2	30	24		
Scotland	N/A	N/A	N/A	N/A	P/S1	33	20	N/A	N/A
					S2	30	15		
Spain	30	N/A	N/A	**22.4	P/S1	40	30	N/A	N/A
Sweden	N/A	11.1	11.5	12.4	P	25	21	N/A	N/A
					S1	30	24		
					S2	30	24		
Switzerland	N/A	N/A	N/A	N/A	P	22	19	N/A	N/A

SOURCE
(a) UNESCO Statistical Yearbook, 1991; OECD (1992); and Nelson (1991) for American Federation of Teachers (AFT) data
(b) WCOPT (1988, 1991) and individual country reports
(c) International Labor Organization in World Confederation of the Organizations of the Teaching Profession (WCOTP) (1991) except U.S., Canada, and Japan
(d) Intended to represent full time equivalent (FTE) students and FTE teachers

* Pupil-teacher ratio.
** No part-time teacher data; unable to estimate full time equivalent (FTE) teachers.
*** Public school data only (about 90 percent of teachers), from U.S. Department of Education (1992a)

Table 3.
Workweek and school year for teachers

	School days		Teacher days	Estimated weeks of work (b)	Weeks of vacation			Estimated hours per week		
	Per week	Per year			Total	Summer	All other	Level	Instruction	Required
United States	5	180	185	37.0	14.0	10	4	P	30.5	36.0
								S1	20.8	36.2
								S2	22.9	36.5
Canada	5	180-200	180-195	38.0	13.5	8	5.5	P	27.5	32.5
								S1	25.0	32.5
								S2	20.0	32.5
Japan	6	210-220	N/A	36.7	12-13	N/A	N/A	N/A	20	*25-29
								20	*30	
								20	*32	
Australia	5	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Austria	5-6	216	216	39.3	13.5	8	5.5	N/A	20-22	N/A
Belgium	5	182	N/A	36.4	N/A	N/A	N/A	P	18-24	22-29
								S1	18-20	22-24
								S2	16-18	20-22
Denmark	5	200	204	40.8	13.0	7	6	P/S1	20-21	25
	5	203	199	39.8	12.0	7	5	S2	16-17	22-24
England and Wales	5	190	195	39.0	13.0	6	7	P	24-30	32
								S1/S2	20-24	32
Finland (a)	5	190	193	38.6	14.5	11	3.5	P	18	17-23
								S1	12-18	15-23
								S2	12-18	15-23
France (a)	5	175	176	35.2	14.0	6	8	P	27	29
								S1	21-23	N/A
								S2	15-18	N/A
Germany	5-6	225	225	40.9	13.5	6	7.5	P	21	25-30
								S1	20	27-28
								S2	18	24
Ireland	5	180	184	36.8	16.0	10	6	P	25	28
	5-6	200	200	36.4				S1/S2	18-22	28
Italy	6	215	215	35.8	17.0	13	4	P	24	29
	5							S1	18	23
	N/A							S2	18	23
Netherlands	5	195	190	38.0	15.0	7	8	P	27	40
								S1	24	29
								S2	24	29
Norway (a)	5	185	190	38.0	14.0	8	6	P	21	27
	**5	187	190	38.0				S1	17-20	22-26
	N/A	N/A	N/A	N/A				S2	13-18	17-24
Scotland	5	190	195	39.0	12.0	7	5	P	25	32.5
								S1/S2	23	32.5
Spain	5	165	190	38.0	N/A	N/A	N/A	P/S1	25	30
								S2	15-18	15/18
Sweden	5	178	191-194	38.4	15.0	10	5	P	20	26
								S1	16	24
								S2	14-19	24
Switzerland	5-6	200-240 (varies between cantons)	40.0	12-16	N/A	N/A	N/A	P	25	25
								S1	23	23
								S2	17-21	17-21

*Applies to students; teacher workload may be less.
**Three days per week for teachers.
(a) No overtime work included. Salary data in other parts of this report include overtime pay.
(b) Estimates usually derived from workday data; may not match vacation data, which come from World Confederation of the Organizations of the Teaching Profession (WCOTP) (19

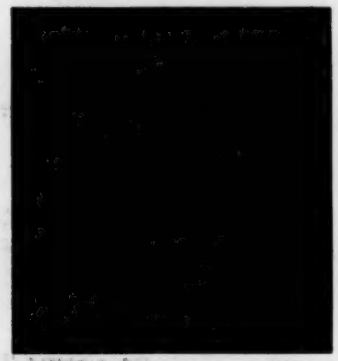
SOURCE:
World Confederation of the Organizations of the Teaching Profession (WCOTP) (1986, 1991); Commission of the European Communities (1988); Neave (1988); National Education Association (NEA) (1992); Nelson (1991); United Nations Educational, Scientific and Cultural Organization (UNESCO) (1992); Organization for Economic Co-operation and Development (OECD) (1990); Ishizaka (1988); and individual country reports.

Training

European nations tend to require more years of training for their secondary teachers than do the United States, both of which require less for primary teachers. Training periods for primary teachers have recently been lengthened in such nations as Finland, France, and Sweden. Teachers in the United States, Canada, Japan, Australia, and the United Kingdom receive similar teacher training, as measured by years of training and level of training. Primary teachers in these nations have about the same number of years of training as secondary teachers.[1]

Measuring Teacher Pay

Teacher salaries are measured in two ways: 1) the power of teacher salaries to purchase goods and services, measured by converting salaries to U.S. dollars using PPPs, and 2) the power to attract individuals to become teachers, as measured by the ratio of teacher salaries to GDP per capita (see table 4).



PPPs are used to convert currency into units of general purchasing power (i.e., power to purchase food, clothing, housing, transportation, etc.). Teacher salaries converted using PPPs represent the sacrifice of other goods and services (the market basket of goods and services, reflective of the economy as a whole) that a country gives up to support a teacher. In other words, teacher salaries expressed in U.S. dollars indicate the cost of teachers relative to the general market basket of goods.

Salary dollars equated to U.S. dollars using PPPs do not represent units of education purchasing power (i.e., the power to purchase teachers, textbooks, etc.). Schools must compete against other employers, occupations, and sectors of the economy to secure candidates for teaching who have suitable training and skills. To argue that U.S. teachers have a high standard of living compared with teachers in other countries does not mean that they are overpaid, well paid, or even adequately paid. That judgment can be made only by comparing teacher salaries with those of other workers in the economy, that is, the cost of teachers relative to the general price of labor. Low teacher pay relative to other workers makes it difficult to find a sufficient pool of well-qualified candidates for the teaching profession. The salary comparison presented in this section shows that U.S. primary teachers have above-average incomes relative to a general market basket of goods, but low incomes relative to the general standard of living. The somewhat higher ranking for the United States when comparing teacher pay in dollars (using PPPs for currency conversion) is primarily a product of the generally higher price of labor in the U.S. economy and the higher U.S. standard of living, rather than representing a huge investment in real teacher resources.

Primary Teacher Salaries

Although the salaries of primary teachers are higher in the United States than in most other countries in absolute terms (U.S. dollars), they are just below average when measured relative to national standards of living (per capita GDP), as shown in table 4 and illustrated in tables 1 and 2. At the mid-career level (about 15 years of teaching experience), the ratio of U.S. teacher pay to per capita GDP is about average, with seven countries having lower ratios and nine having higher ratios. At the maximum salary level, the ratio of U.S. teacher pay to per capita GDP ranks only above the ratios for Italy, Norway, Sweden, and Denmark, among the 19 nations studied.

At mid-career, only Canada, Japan, and Switzerland pay more than the U.S. when PPPs are used to convert currencies. These nations have the highest standard of living in the world as measured by gross domestic product per capita (Japan ranks fifth, Canada ranks third, and Switzerland ranks second). Japanese primary teachers earning the maximum salary enjoy a $5,000 advantage over U.S. teachers, Toronto's teachers have a $10,000 advantage, and Zurich's teachers have an $18,000 advantage.

[1]Consult *How U.S. Teachers Measure Up Internationally* (Nelson and O'Brien 1993) for more specific information on teacher training.

Table 4.
Primary teacher salaries compared with those in the United States

	Years to maximum	PPP rate	Teacher salary vs. dollars (PPP conversion)			Per capita GDP	Teacher-salary-to-per-capita-GDP ratio		
			Starting	Mid-career (<15 years)	Maximum		Starting	Mid-career (<15 years)	Maximum
United States	16	1.00	$22,171	$34,213	$37,771	22,868	96	149	165
Non-European									
Australia	10	1.36	20,279	29,544	29,544	16,566	122	178	178
Canada (Toronto)	11	1.29	24,521	45,939	48,549	20,027	122	229	242
Canada (Saskatchewan)	11	1.29	21,579	37,189	39,465	20,027	107	185	197
Canada (Quebec)	15	1.29	22,077	35,746	38,560	20,027	110	178	192
Japan	32	0.19	17,743	31,879	43,324	19,026	93	167	227
British Isles									
England and Wales	10	0.64	17,443	31,457	32,709	16,383	106	192	199
Ireland	25	0.67	17,953	28,525	35,334	11,992	149	237	294
Scotland	13	0.64	18,286	31,934	31,934	16,383	111	194	194
Central Europe									
Austria	17	14.20	16,514	28,414	30,728	18,332	90	154	167
Belgium	27	39.19	17,919	23,335	27,850	17,910	100	130	155
France—*instituteurs (petits)*	22	6.56	18,441	23,900	27,569	19,014	96	125	144
France—*instituteurs des écoles*	25-30	6.56	17,079	26,292	32,616	19,014	89	138	171
France—*grand choix* (30 percent)	20	6.56	17,079	28,085	32,616	19,014	89	147	171
Germany	21	2.13	26,799	32,664	35,179	19,809	135	164	177
Italy	40	1.499	15,522	18,876	24,192	17,494	88	107	138
Netherlands	26	2.16	16,482	23,742	30,342	17,134	96	138	177
Spain	43	0.116	23,696	26,096	30,509	13,125	180	198	232
Switzerland, urban	24	2.26	30,583	41,194	46,148	22,091	138	186	208
Switzerland, rural	27	2.26	25,220	34,129	39,547	22,091	114	154	179
Switzerland (Zurich)	25	2.26	33,070	45,375	56,188	22,091	149	205	254
Northern Europe									
Denmark	19	9.30	20,799	25,380	26,386	18,383	113	138	143
Denmark	19	9.30	19,431	24,501	25,753	18,383	105	133	140
Finland	18	6.38	15,058	23,071	23,598	16,163	93	142	146
Finland	18	6.38	16,575	25,464	25,974	16,163	102	157	160
Norway	16	10.18	17,490	20,366	21,862	17,491	99	116	124
Sweden	23	8.44	17,175	22,066	25,578	16,695	102	132	153
Selected Non-OECD Nations									
Hong Kong	*16	7.75	18,108	35,016	36,766	N/A	N/A	N/A	N/A
Taiwan	*25	25.10	15,059	22,589	30,119	N/A	N/A	N/A	N/A
Taiwan—"A" Bonus	*25	25.10	15,059	25,099	33,466	N/A	N/A	N/A	N/A
India	*21	16.20	1,453	2,087	2,133	N/A	N/A	N/A	N/A
Pakistan	*15	20.50	971	1,561	1,603	N/A	N/A	N/A	N/A

*Market exchange rate

Table 5.
Lower secondary teacher salaries compared with those in the United States

	Years to maximum	PPP rate	Teacher salary vs. dollars (PPP conversion)			Per capita GDP	Teacher-salary-to-per-capita-GDP ratio		
			Starting	Mid-career (<15 years)	Maximum		Starting	Mid-career (<15 years)	Maximum
United States	16	1.00	22,171	34,213	37,771	22,868	96	149	165
Non-European									
Australia	10	1.35	20,279	29,545	29,544	16,566	122	178	178
Canada (Toronto)	11	1.30	39,224	46,375	46,967	20,027	195	231	234
Canada (Saskatchewan)	11	1.30	21,579	37,190	39,465	20,027	107	185	197
Canada (Quebec)	15	1.30	22,077	35,745	38,560	20,027	110	178	192
Japan	32	0.20	17,743	31,880	43,324	19,026	93	167	227
British Isles									
England and Wales	10	0.65	17,443	32,710	35,985	16,383	106	199	219
Ireland	25	0.65	17,953	28,525	35,334	11,992	149	237	294
Scotland	13	0.65	18,286	31,935	31,934	16,383	111	194	194
Central Europe									
Austria	17	14.20	17,593	34,335	37,400	18,332	95	187	204
Belgium	27	39.15	17,973	24,925	30,541	17,910	100	139	170
France—*instituteurs des écoles*	25-30	6.55	18,057	27,800	34,485	19,014	94	146	181
France—*grand choix* (30 percent)	20	6.55	18,057	29,695	34,485	19,014	94	156	181
Germany	21	2.15	29,942	36,275	38,993	19,809	151	183	196
Italy	40	1.500	16,963	20,885	27,066	17,494	96	119	154
Netherlands	23	2.15	19,050	26,960	33,762	17,134	111	157	197
Spain	43	0.115	23,696	26,095	30,509	13,125	180	198	232
Switzerland, urban	24	2.25	34,642	46,775	52,391	22,091	156	211	237
Switzerland, rural	27	2.25	30,454	41,300	47,896	22,091	137	186	216
Switzerland (Zurich)	22	2.25	38,537	49,900	60,046	22,091	174	225	271
Northern Europe									
Denmark	19	9.30	20,799	25,380	26,386	18,383	113	138	143
Denmark	19	9.30	19,431	24,500	25,753	18,383	105	133	140
Finland	18	6.40	19,764	30,365	30,974	16,163	122	187	191
Norway	16	10.20	18,599	20,765	23,059	17,491	106	118	131
Sweden	20	8.45	19,138	23,995	25,578	16,695	114	143	153
Selected Non-OECD Nations									
Hong Kong	23*	7.75	20,972	40,290	57,785	N/A	N/A	N/A	N/A
Taiwan	25*	25.0	15,059	22,590	30,119	N/A	N/A	N/A	N/A
Taiwan—"A" Bonus	25*	25.0	15,059	25,100	33,466	N/A	N/A	N/A	N/A
India	25*	16.0	1,863	2,810	2,916	N/A	N/A	N/A	N/A
Pakistan	15*	20.5	1,253	2,230	2,298	N/A	N/A	N/A	N/A

*Market exchange rates

Table 6.
Upper secondary teacher salaries compared with those in the United States

	Years to maximum	PPP rate	Teacher salary vs. dollars (PPP conversion)			Per capita GDP	Teacher-salary-to-per-capita-GDP ratio		
			Starting	Mid-career (<15 years)	Maximum		Starting	Mid-career (<15 years)	Maximum
United States	16	1.00	22,171	34,213	37,771	22,868	96	149	165
Non-European									
Australia	10	1.36	20,279	29,544	29,544	16,566	122	178	178
Canada (Toronto)	11	1.29	39,224	46,375	46,967	20,027	195	231	234
Canada (Saskatchewan)	11	1.29	21,579	37,189	39,465	20,027	107	185	197
Canada (Quebec)	15	1.29	22,077	35,746	38,560	20,027	110	178	192
Japan	32	0.19	17,958	32,277	45,251	19,026	94	169	237
British Isles									
England and Wales	10	0.64	17,443	32,709	38,175	16,383	106	199	233
Ireland	25	0.67	17,953	28,525	35,334	11,992	149	237	294
Scotland	13	0.64	18,286	31,934	31,934	16,383	111	194	194
Central Europe									
Austria	17	14.20	20,995	42,424	46,511	18,332	114	231	253
Belgium	25	39.16	22,006	32,070	38,688	17,910	122	179	216
France—*instituteurs des écoles*	25-30	6.56	17,536	26,997	33,490	19,014	92	141	176
France—*grand choix* (30 percent)	20	6.56	17,536	28,838	33,490	19,014	92	151	176
France—extra class	N/A	6.56	N/A	30,320	37,376	19,014	159	196	N/A
France—*professeurs agrégés*	25-30	6.56	31,274	39,232	45,182	19,014	164	206	237
Germany	21	2.13	31,340	39,555	43,070	19,809	158	199	217
Italy	40	1.500	16,963	21,566	28,386	17,494	96	123	162
Netherlands	21	2.16	23,742	39,551	45,168	17,134	138	230	263
Spain	43	0.115	27,677	30,500	36,079	13,125	210	232	274
Spain	43	0.116	30,690	33,687	39,093	13,125	233	256	297
Switzerland, urban	24	2.26	39,369	53,305	59,843	22,091	178	241	270
Switzerland, rural	22	2.26	37,783	48,409	53,905	22,091	171	219	244
Switzerland (Zurich)	20	2.26	45,715	60,511	70,154	22,091	206	273	317
Northern Europe									
Denmark	14	9.30	26,524	39,212	39,212	18,383	144	213	213
Finland	18	6.38	21,560	31,395	33,786	16,163	133	194	209
Norway	16	10.18	21,665	25,719	27,652	17,491	123	147	158
Sweden	20	8.44	22,009	27,595	29,415	16,695	131	165	176
Selected Non-OECD Nations									
Hong Kong	*23	7.75	20,972	40,289	57,785	N/A	N/A	N/A	N/A
Taiwan	*25	25.10	15,059	22,589	30,119	N/A	N/A	N/A	N/A
Taiwan—"A" Bonus	*25	25.10	15,059	25,099	33,466	N/A	N/A	N/A	N/A
India	*21	16.20	2,122	3,272	3,726	N/A	N/A	N/A	N/A
Pakistan	*15	20.50	1,536	2,709	2,818	N/A	N/A	N/A	N/A

*Market exchange rates

Secondary Teacher Salaries

By international standards, American high school teachers are less trained and less well paid than in other countries. American high school teachers, particularly the most senior ones, are paid significantly less in absolute terms (U.S. dollars) and much less in relative terms (the salary-to-per-capita-GDP ratio) as shown in table 6 and illustrated in tables 1 and 2. American high school teachers need at least a 4-year college degree to practice their profession, but most European countries generally expect their high school teachers to have 5 or 6 years of training. European upper secondary teachers are considered to belong to a different, more highly paid and trained occupation than primary teachers.

Mid-career upper secondary teachers in Austria, Germany, Denmark, France, the Netherlands, Switzerland, and Canada enjoy higher standards of living. Senior teachers in Belgium, Japan, and Spain also do better than their U.S. counterparts. While senior U.S. upper secondary teachers earn about $38,000 in a nation with the world's highest per capita income, senior Austrian teachers (*magister*) get $46,000; senior French teachers (*agrégés*) get $45,000; senior German teachers earn $43,000; senior Japanese teachers get $45,000; senior teachers in Ottawa, Canada earn $47,000; and senior teachers in Zurich, Switzerland earn $70,000.

At both mid-career and maximum salary levels, Norway and Italy are the only nations among the 19 nations studied that have lower ratios of teacher pay to per capita GDP than the United States. While senior U.S. high school teachers make 65 percent more than the per capita GDP, upper secondary teachers in 10 other nations earn at least double the per capita GDP. Senior teachers in Austria, the Netherlands, and Switzerland earn at least two and a half times the per capita GDP.

Teacher Salary Structures

Every Nation studied based teacher pay on a lock-step schedule based primarily on years of experience, although France, Australia, and England offer a few pay flexibilities tied closely to the national salary schedule. In all nations studied, teacher experience figured prominently in the salary schedule, with years of postsecondary education or the grade level of students taught also frequently determining salary levels. The length of a typical U.S. salary schedule of 16 years is about average among the 19 nations studied. Australia, Canada, England, and Scotland have schedules of about 10 years in length. The Japanese salary schedule has 32 steps, while Italy and Spain provide for small continuous salary increments throughout a teacher's career. Most European nations have always paid primary teachers less than secondary teachers, but the trend is toward greater uniformity in the salary schedule and increasing training for primary teachers, as in Finland, France, and Sweden.

The variation in teacher salaries across Am[illegible] more than 15,000 scho[illegible] dwarfs the variation [illegible] in other advanced industrialized countries and would be considered intolerable by international standards. Most countries have a national salary schedule, and those that do not—Australia, Canada, and Switzerland—show much more salary schedule conformity among their states, provinces, or cantons than does the United States among its states and school districts within states. Australia's eight states and territories have almost identical salary scales. High-paying Ontario pays about one-third more than Quebec, the lowest-paying province. Swiss high school teacher salaries vary by about $20,000 among cantons, but the lowest-paying canton has salaries over $50,000. Salaries do not vary within Australian states or Swiss cantons and vary only slightly within Canadian provinces. *How U.S. Teachers*

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Table 7.
1991-92 state average salaries in the United States compared with high school teacher salaries in other nations

	Nation	Salary in U.S. dollars	Per capita Year	Salary-to per-capita-GDP	GDP ratio	Rank
Mid-career teacher (about 15 years)						
1	Switzerland (Zurich)	60,511	12	22,091	2.74	1
2	Switzerland (Basel)	48,409	12	22,091	2.19	2
3	Switzerland (Glaris)	48,152	12	22,091	2.18	3
4	Canada (Ottawa)	46,375	11	20,027	2.32	4
5	Austria	42,424	15	18,332	2.31	5
6	Germany	39,555	15	19,809	2.00	6
7	Netherlands	39,551	15	17,134	2.31	7
8	France	39,232	15	19,014	2.06	8
9	Denmark	39,212	14	18,383	2.13	9
10	Canada (Saskatchewan)	37,189	11	20,027	1.86	10
11	Canada (Quebec)	35,746	15	20,027	1.78	11
12	Spain	33,687	15	13,125	2.57	12
13	England	32,709	10	16,383	2.00	13
14	Japan	32,277	15	19,026	1.70	14
15	Belgium	32,070	15	17,910	1.79	15
16	Scotland	31,934	13	16,383	1.95	16
17	Finland	31,395	15	16,163	1.94	17
18	Australia (New S. Wales)	29,544	10	16,566	1.78	18
19	South Australia	28,790	8	16,566	1.74	19
20	Australia (Victoria)	28,639	10	16,566	1.73	20
21	Ireland	28,525	15	11,922	2.39	21
22	Sweden	27,595	15	16,695	1.65	22
23	Norway	25,719	15	17,491	1.47	23
24	Italy	21,566	15	17,494	1.23	24
Maximum Salary for Senior Teachers						
1	Switzerland (Zurich)	70,154	20	22,091	3.18	1
2	Switzerland (Basel)	53,905	24	22,091	2.44	6
3	Switzerland (Glarus)	52,763	22	22,091	2.39	7
4	Canada (Ottawa)	46,967	11	20,027	2.35	10
5	Austria	46,511	17	18,332	2.54	5
6	Japan	45,251	32	19,026	2.38	8
7	France	45,182	25	19,014	2.38	9
8	Netherlands	45,168	21	17,134	2.64	4
9	Germany	43,070	21	19,809	2.17	12
10	Canada (Saskatchewan)	39,465	11	20,027	1.97	16
11	Denmark	39,212	14	18,383	2.13	14
12	Spain	39,093	43	13,125	2.98	2
13	Belgium	38,688	25	17,910	2.16	13
14	Quebec	38,560	15	20,027	1.93	18
15	England	38,175	10	16,383	2.33	11
16	Ireland	35,334	25	11,922	2.96	3
17	Finland	33,786	18	16,163	2.09	15
18	Scotland	31,934	13	16,383	1.95	17
19	South Australia	29,770	a	16,566	1.80	19
20	Australia (Victoria)	29,544	a	16,566	1.78	20
21	Australia (New S. Wales)	29,544	a	16,566	1.78	21
22	Sweden	29,415	20	16,695	1.76	22
23	Italy	28,386	40	17,494	1.62	23
24	Norway	27,652	15	17,491	1.58	24

Table 7—continued.
1991-92 state average salaries in the United States compared with high school teacher salaries in other nations

	Nation	Salary in U.S. dollars	Per capita Year	Salary-to per-capita-GDP	GDP ratio	Rank
Mid-Career Teacher (About 15 Years)						
1	Connecticut	47,510	16	28,590	1.66	6
2	Alaska	43,800	12	39,682	1.10	50
3	New York	43,335	15	25,780	1.68	5
4	New Jersey	41,027	15	27,487	1.49	20
5	Michigan	40,700	16	20,998	1.94	2
6	California	40,425	15	24,911	1.62	11
7	District of Columbia	39,673	18	75,673	0.52	51
8	Rhode Island	39,366	17	18,957	2.08	1
9	Maryland	39,073	15	21,370	1.83	4
10	Pennsylvania	38,715	16	21,056	1.84	3
11	Massachusetts	37,256	16	25,339	1.47	25
12	Nevada	36,988	14	24,805	1.49	21
13	Illinois	36,528	16	24,389	1.50	19
14	Wisconsin	35,227	15	21,542	1.64	10
15	Washington	34,880	15	22,577	1.54	16
16	Delaware	34,548	15	24,291	1.42	31
17	Hawaii	34,488	16	27,204	1.27	44
18	Indiana	34,247	15	21,255	1.61	12
19	Oregon	34,101	13	20,578	1.66	7
U.S. AVERAGE		34,027	16	22,868	1.49	
20	Minnesota	33,700	16	23,938	1.41	34
21	Vermont	33,200	13	21,351	1.55	15
22	Ohio	33,198	14	20,896	1.59	13
23	New Hampshire	33,170	13	22,742	1.46	27
24	Colorado	33,072	14	23,033	1.44	28
25	Virginia	32,243	14	23,054	1.40	35
26	Arizona	31,176	12	19,032	1.64	9
27	Florida	31,070	13	18,793	1.65	8
28	Kentucky	30,880	14	20,467	1.51	18
29	Wyoming	30,425	13	26,883	1.13	49
30	Maine	30,097	14	19,803	1.52	17
31	Texas	29,719	12	22,877	1.30	43
32	Georgia	29,539	12	21,698	1.36	37
33	North Carolina	29,334	14	21,578	1.36	38
34	Iowa	29,196	16	22,151	1.32	41
35	Kansas	29,101	14	22,169	1.31	42
36	Missouri	28,923	14	21,483	1.35	40
37	Tennessee	28,621	14	21,247	1.35	39
38	South Carolina	28,209	13	18,948	1.49	22
39	Montana	27,590	13	18,737	1.47	23
40	West Virginia	27,366	13	17,339	1.58	14
41	Nebraska	27,231	14	22,536	1.21	46
42	Arkansas	27,168	12	18,569	1.46	26
43	Alabama	26,954	14	18,955	1.42	32
44	Utah	26,524	11	18,671	1.42	33
45	Oklahoma	26,514	12	18,473	1.44	29
46	Louisiana	26,411	14	21,332	1.24	45
47	Idaho	26,345	12	18,521	1.42	30
48	New Mexico	26,244	14	18,913	1.39	36
49	North Dakota	24,495	13	21,577	1.14	48
50	Mississippi	24,368	13	16,572	1.47	24
51	South Dakota	23,291	12	19,425	1.20	47

Measure Up Internationally (Nelson and O'Brien 1993) contains the national salary schedule, or a statistical equivalent, for each of the 19 nations.

Comparison of U.S. High School Teacher Salaries with International Teacher Salaries

The variation in U.S. teacher pay, as well as the low level of U.S. teacher pay, is illustrated for high school teachers in table 7. The right side of the table ranks U.S. states by average teacher salary. To enhance comparability, the average experience level of teachers in each state (averaging 16 years in the United States) is recorded. The ratio of state average salary to state GDP per capita is calculated, where state GDP is the value of all goods and services produced within the borders of a state. The left side of table 7 contains an international salary ranking for teachers at mid-career (about 15 years of experience) and the maximum salary. Several Australian states, Canadian provinces, and Swiss cantons are included in the analysis. Although listed in order by salary in U.S. dollars, the rank of the teacher-salary-to-per-capita-GDP ratio is also listed.

At the mid-career level, Connecticut, the highest-paying U.S. state, is eclipsed only by two Swiss cantons. At the other extreme, South Dakota, the lowest paying U.S. state, ranks behind every country except Italy. The U.S. dollar comparison, however, does not necessarily reflect how well teachers are paid. In the United States, the cost of living varies substantially among the states. Furthermore, as argued earlier in this section, the teacher-salary-to-per-capita-GDP ratio is a better way to judge the competitiveness of teacher salaries in attracting qualified candidates to teaching. By this measure, Connecticut's salary-to-GDP ratio of 1.66 ranks below that of every other nation, state, province, and canton, except Norway and Italy. Only seven U.S. states have a higher salary-to-per-capita-GDP ratio than Sweden, and Sweden pays better than only two other countries—Norway and Italy. Rhode Island, the highest-paying state according to salary-to-per-capita-GDP ratio (with a ratio of 2.08), ranks below the three Swiss cantons, Ottawa, Austria, Germany, the Netherlands, France, Denmark, Spain, and England.

Conclusions and Recommendations

Investing more money in education will have little effect unless it improves the teaching force and teachers are used efficiently to meet the educational needs of children. The low relative pay of U.S. teachers coincides with the general notion that low teacher pay in the United States makes it difficult to recruit teachers who graduate in the top half of their college graduating classes. The findings in this study suggest changes that would allow the United States to conform more closely to international standards for teacher pay and working conditions:

- Reduce interdistrict and interstate variations in teacher pay, standardizing teacher training across state boundaries, and creating a mechanism for converting pension plans across state lines; these changes would promote teacher mobility and reduce variation in the quality of teacher preparation.
- Increase training for senior high school subject teachers and improving pay commensurate with training.
- Eliminate the practice of placing experienced teachers new to a district lower on the salary schedule than their experience warrants.
- Focus pay flexibility initiatives on the crucial issues of recruitment, teacher retention, and specific skills, rather than on more subjective efforts, such as merit pay.
- Shorten the summer break and lengthening the fall and spring breaks to enhance the continuity of instruction and give both teaching and learning a more year-round focus.

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